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WORK PLAN
FOR
CONSTRUCTION AND OPERATION OF SOIL VAPOR EXTRACTION SYSTEM
AT OPERABLE UNIT 02, SITE 10
MCAS CHERRY POINT, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
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1.0 INTRODUCTION

This Remedial Action Work Plan, (RAWP) presents the technical approach developed by OHM Remediation Services Corp. (OHM) for the implementation of a portion of the selected remedy for Operable Unit 02 (Site 10, Site 44A, Site 46 and Site 76) at the Marine Corps Air Station (MCAS), Cherry Point, North Carolina. The selected remedy for groundwater is natural attenuation and institutional controls. The selected remedy for soil and waste is soil vapor extraction, (SVE) and institutional controls. The major components of the site-wide remedy are:

- Maintaining records of the contamination at OU2 in the MCAS Cherry Point Base Master Plan;
- Restricting land use at OU2 to industrial uses with provision for no intrusive activities without prior written consent from the North Carolina Department of Environment Health & Natural Resources' (NCDEHNR) Superfund Section;
- Restricting the use of groundwater beneath OU2 with provision for no installation of wells with the exception of monitoring wells;
- Installing a fence around the polishing ponds, and repair and replacement of existing fencing;
- Placing warning signs along the fence, Slocum Creek, and Turkey Gut;
- Monitoring of groundwater under OU2 and surface water and sediment in Slocum Creek and Turkey Gut; and
- In-situ treatment using soil vapor extraction at major soil "hot spots" further defined as secondary source areas that are contaminated with volatile organics. This includes monitoring of air emissions and soil to evaluate the effectiveness of treatment (see Sampling and Analysis Plan attached as Appendix A).

1.1 PURPOSE OF THE PLAN

This remedial action work plan specifically addresses the in-situ treatment using soil vapor extraction at the major soil "hot spots" and identifies and describes how OHM will implement this major task associated with supplying, installing, and operating the soil vapor extraction system.

Supplemental plans developed under this delivery order for guidance during the construction of the in- situ treatment system are included as Appendices and listed below:

- Contractor's Sampling and Analysis Plan;
- Environmental Protection Plan;
- Erosion and Sediment Control Plan;
- Contractor's Quality Control Plan;
- Transportation and Disposal Plan; and
- Manufacturer's Catalog Data.

A Site Specific Health and Safety Plan (SHSP) for this project has been submitted as an independent document. Specifications, construction drawings, and the basis for this design for this remedial action were utilized to prepare this RAWP. To avoid repetition of effort, portion of the following documents have been utilized within this RWAP to provide sufficient information for a reader unfamiliar with the site to understand the challenges of the remedial actions:

- Brown and Root Environmental, Data Gap Investigation and SVE Treatability Study Work Plan for Operable Unit 02, February 1997
- Brown and Root Environmental, Basis of Design Report VOC Soil Hot Spot Remedial Design, April 1997
- Brown and Root Environmental, Feasibility Study, July 1997
- Brown and Root Environmental, Remedial Investigation - Vols. I - V, April 1997
- Brown and Root Environmental, Pilot-Scale SVE System, July 1997
- Brown and Root Environmental, Interim Measures Record of Decision, June 1997 (revised September 1997)
- Brown and Root Environmental, Proposed Remedial Action Plan, July 1997 (revised August 1997)

1.2 BACKGROUND INFORMATION

This section presents the location and description of OU2. Also, presented is a brief historical background of the OU2 sites. The synopsis of the history provides an indication of the sources that might have been the cause of contamination at OU2.

MCAS Cherry Point is a military installation located in southeastern Craven County, North Carolina, just north of the town of Havelock, North Carolina. The station covers approximately 11,485 acres on a peninsular north of Core and Bogue Sounds and south of the Neuse River. The general location of the Air Station is shown on Figure 1.

OU2 is located in the west/central portion of the Air Station. OU2 is bounded by the Sewage Treatment Plant (STP) to the north, Roosevelt Boulevard tot he east, a residential area to the south, and Slocum Creek to the west. OU2 consists primarily of the Site 10 landfill. It also includes the polishing ponds (Site 46) north of the landfill, a former sludge application area (Site 44A formerly Site 45) located in the north-central portion of OU2, and the vehicle maintenance area (Hobby Shop) (Site 76) located southwest of the landfill.

The MCAS Cherry Point mission is to maintain and support facilities, services, and material of a Marine Aircraft Wing, or units thereof, and other activities and units as designated by the Commandant of the Marine Corps in coordination with the Chief of Naval Operation. Occupants at the Air Station include:

- Second Marine Aircraft Wing
- Naval Aviation Depot
- Combat Service Support Detachment 21 of the Second Force Service Support Group
- Naval Hospital
- Dental Clinic
- Naval Air Maintenance Training Group Detachment
- Defense Reutilization and Marketing Office
- Training Facilities for the Fleet Marine Force Atlantic Aviation Units

The MCAS was commissioned in 1942. Continuing construction in 1943 added a massive aircraft assembly and repair shop, which later became the NADEP. During the 1950s and 1960s, the size of the Air Station increased from 7,582 acres to more than 11,000 acres as a result of land acquisitions. During the 1970s, commercial and residential development of the surrounding area grew substantially. In 1980, the City of Havelock annexed MCAS Cherry Point.

1.3 SITE DESCRIPTION

OU2 consists of four sites located in proximity to the Site 10 - Old Sanitary Landfill. These sites have been grouped into one operable unit because of their proximity to each other (i.e. Site 44A - the Former Sludge Application Area overlies portions of the Site 10 landfill, and Site 46 - Polishing Ponds No. 1 and 2, and Site 76 - Vehicle Maintenance Area (Hobby Shop) are located adjacent to the landfill). Site locations are depicted on Figure 1. A brief description of these site follows.

Site 10 - Known as the Old Sanitary Landfill, served as the primary disposal site at the MCAS from 1950s until the early 1980s. The landfill is approximately 40 acres in size. The former sludge impoundment area was closed in the mid-1980s. This area was regulated as a hazardous waste management unit under the MCAS's Part B Permit. Also, included in this site is an area that was formerly utilized for storage of petroleum products.

Site 44A - Known as the Former Sludge Application Area, consists of two areas where sludge from the sewage treatment plant (STP) was applied. This site was regulated as hazardous waste management unit under the MCAS's Part B Permit.

Site 46 - Known as the Polishing Ponds No. 1 and 2, consists of two inactive unlined ponds that served as aeration basins for wastewater from the STP. The ponds are approximately 12 feet deep.

Site 76 - Known as the Vehicle Maintenance Area or Hobby Shop, consists of a building and parking lot where base personnel vehicles are repaired.

1.4 ENVIRONMENTAL CONDITIONS REPORT

The purpose of this section is to document the current site conditions prior to remedial action and to provide a photographic log of the existing environmental conditions of Operable Unit 2 and adjacent property.

Also, included in this section is a brief summary of pertinent information on the site's geology, hydrogeology, and surface water. A more complete description of the physical characteristics of the site is located in the Feasibility Study for Operable Unit 02 prepared by Brown and Root Environmental, dated July 1997.

The OHM Project Geologist conducted a site walk with a representative from the ROICC's Office. A photographic log of site conditions is located at the conclusion of this section.

MCAS Cherry Point is located within the Coastal Plain Physiographic Province. It is underlain by about 3,000 feet of interbedded, unconsolidated to partially consolidated sedimentary deposits of sand, silt, clay, shell, and limestone that range in age from Cretaceous to Holocene. These deposits form a wedge- shaped mass that thickens from a feather edge at the Fall Line to as much as 10,000 feet at Cape Hatteras. The Coastal Plain deposits are underlain by igneous and metamorphic basement rocks.

Four types of lithologic materials were reported by Brown and Root Environmental during their subsurface investigation at the OU2 area. These were identified as fill material, the undifferentiated surficial formation, the Yorktown Formation, and the upper portion of the Pungo River Formation. The fill material was reported to consist of sand, silt, clay mixed with refuse consisting of domestic trash, industrial waste, construction debris, wood, plastic, rubber, glass, asphalt, concrete, and metal fragments.

Four hydrogeologic unit were encountered during the subsurface investigation performed by Brown and Root at OU2. These are: the surficial aquifer, the Yorktown confining unit, the Yorktown Aquifer, and the upper portion of the Pungo River confining unit.

Groundwater beneath the site was encountered in the surficial aquifer at approximately 7 to 22 feet below ground surface, and water-level elevations ranged from approximately 2.6 to 22 feet mean sea level.. It was reported that groundwater flows toward and discharges into either Slocum Creek or Turkey Gut. Polishing Ponds No. 1 and 2, which are unlined, act as a recharge zone for the surficial aquifer. There are two distinct areas of water table mounding based on April 1996 water level measurements. A large mounding effect in the southeast is due to a topographic high. A small mounding in the central area is due to wells that are located near trenches that act as recharge zones.

Because of the varying hydraulic gradients throughout the operable unit, the seepage velocity (groundwater flow velocity) was calculated for three areas within the site: The sanitary landfill area, the central landfill area south of Turkey Gut, and the landfill area in the southeast corner of the site. Detail reporting of the data can be found in the Feasibility Study dated July 1997, prepared by Brown and Root Environmental.

OU2 is bounded on the west by Slocum Creek, which flows north past the site. Turkey Gut is a perennial stream that flows north westward through the central portion of OU2 and discharge to Slocum Creek. There is a surface drainage swale between the polishing ponds and the Old Sanitary Landfill where standing water is common during wet periods. The swale drains west, discharging to Slocum Creek.

Slocum Creek is classified as SC tidal salt water. This classification is defined as suitable for fish and wildlife propagation, secondary recreation and other uses applicable for waters of lower quality. An erosion and sedimentation plan is located in Appendix C.

1.5 NATURE AND EXTENT OF CONTAMINATION

Soil, groundwater, surface water, sediment and leachate seep samples were collected and analyzed for a variety of parameters, in order to determine the nature and extent of contamination. The environmental protection plan located in Appendix B discusses this topic.

1.6 SITE REMEDIATION GOALS

Target cleanup goals for the soil are presented in the SAP in Appendix A. Appendix H contains data from Brown and Root Environmental's Basis of Design Report for VOC analytical exceeding soil screening criteria. The sample points in Appendix H are plotted in Figures 2, 3, and 4 respectively.

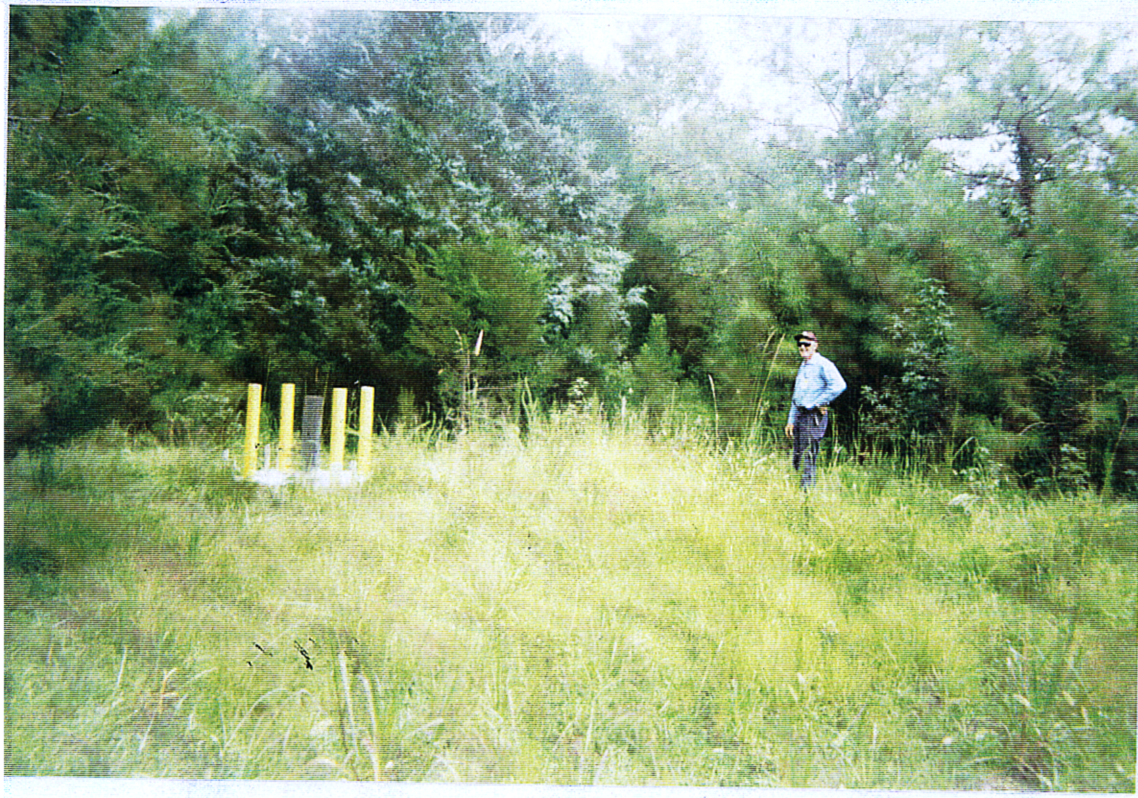
Confirmation sampling procedures are also presented in the Sampling and Analysis Plan in Appendix A. Soil vapor extraction (SVE) was selected by Brown and Root Engineering as the best available technology to remediate petroleum-based hydrocarbons from the soil at this site. The introduction of a vacuum delivered to the subsurface will volatilize hydrocarbons from the soil. As a secondary benefit, increasing the oxygen content within the soil by vacuuming in fresh atmospheric air may also promote aerobic degradation of hydrocarbons by means of in-situ bioremediation.

The following pages detail OHM's SVE remediation system for the OU2, Site 10. OHM plans to install a network of SVE wells. OHM will install twenty-two vertical soil vapor extraction wells to recover volatile hydrocarbons. OHM will also operate the fourteen existing wells from Brown and Root's pilot study.

These 36 wells will be separated into four fields. Hot Spot No.1 will consist of SVE wells 1 through 9, Hot Spot No.2 will consist of SVE wells 10 through 18, Hot Spot No. 3 will consist of SVE wells 19 through 32, and Hot Spot No. 4 will consist of SVE wells 33 through 36. The four well fields for this remediation project will be served by a single SVE blower that will pull vacuum on all four fields simultaneously.

1 Site for SVE Monitoring Well
OU 02, Site 10-Cherry Point, NC

2 CAR Wash Area Outside of OU2-
Proposed Site for Equipment Compound
OU2, Site 10 - Cherry Point, NC



3 SVE Site
OU2, Site 10 - Cherry Point, NC

4 Access to Hot Spot No. 4
OU 02, Site 10 - Cherry Point, NC

5 Access to Hot Spot No. 4
OU 02, Site 10- Cherry Point, NC

6 Pipe Rout to SVE
OU 02, Site 10- Cherry Point, NC

7 Pipe Route to SVE
OU 02, Site 10 - Cherry Point, NC

8 Access Road to Hot Spot No. 4
OU 02, Site 10 - Cherry Point, NC

9 Proposed Site - Opposite Side of Gate
OU 02, Site 10 - Cherry Point, NC

10 Access Road-Near Work Road going
towards Slocum Creek
OU 02, Site 10 - Cherry Point, NC

11 Pilot Plant Area
OU 02, Site 10 - Cherry Point, NC

1 Site for SVE Monitoring Well
OU 02, Site 10-Cherry Point, NC

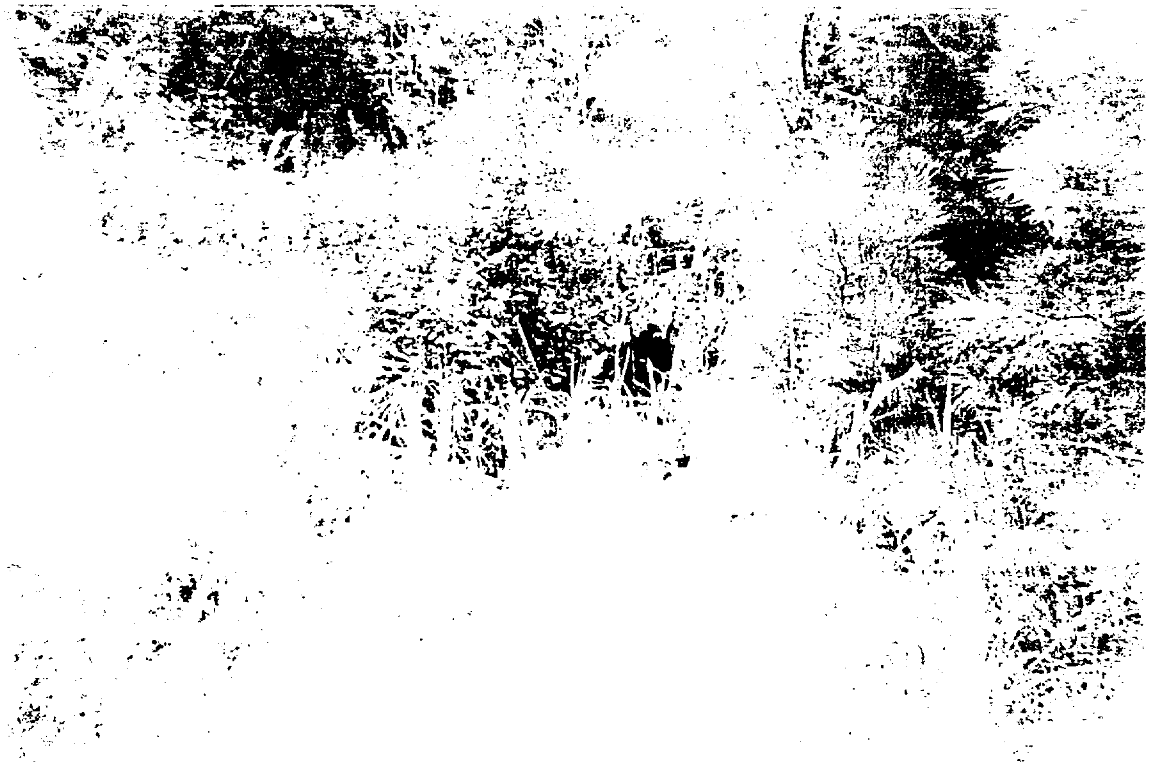
2 CAR Wash Area Outside of OU2-
Proposed Site for Equipment Compound
OU2, Site 10 - Cherry Point, NC

3 SVE Site
OU2, Site 10 - Cherry Point, NC

4 Access to Hot Spot No. 4
OU 02, Site 10 - Cherry Point, NC

5 Access to Hot Spot No. 4
OU 02, Site 10- Cherry Point, NC

6 Pipe Rout to SVE
OU 02, Site 10- Cherry Point, NC



7 Pipe Route to SVE
OU 02, Site 10 - Cherry Point, NC

8 Access Road to Hot Spot No. 4
OU 02, Site 10 - Cherry Point, NC

9 Proposed Site - Opposite Side of Gate
OU 02, Site 10 - Cherry Point, NC

10 Access Road-Near Work Road going
towards Slocum Creek
OU 02, Site 10 - Cherry Point, NC

11 Pilot Plant Area
OU 02, Site 10 - Cherry Point, NC

2.0 PROJECT SCHEDULE

The construction schedule is provided at the end of this section. A revised project schedule will be presented at the pre-construction meeting at MCAS Cherry Point before project mobilization.

2.1 PROCUREMENT SCHEDULE/ EQUIPMENT DELIVERY SCHEDULE

This project will utilize OHM rental equipment accordance with pre-negotiated contract rates. With procurement of the remaining project supplies. all materials for construction will be on site with-in two months.

2.3 PROJECT SIGN

This project is visible to pedestrian and motor vehicle traffic, the need for a project sign will be reviewed and approved by base personnel. The design of the sign will follow the guidelines established in Code 15C. Also, a project sign has been installed at the OHM laydown area.

2.3 REMEDIAL ACTION START DATE

OHM will notify the Navy's Technical Representative (NTR) when substantial, continuous, physical, on- site remedial action begins. Upon receipt of this notification, the NTR will forward a written notification that field activities have commenced to the USEPA, Region IV and North Carolina State DENR, of this date in accordance with SARA section 120(e).

2.4 PROJECT MANAGEMENT PLAN

Management of quality control of the project will be in accordance with the Construction Quality Control (CQC) Plan located in Appendix D. Execution of remedial action activities will be monitored and managed by implementing the following:

- Reporting Requirements
- Project Organization
- Data Management

2.4.1 Reporting Requirements

Report requirements for monthly, post-construction, and final remedial action are discussed in the following sections.

2.4.1.1 Daily and Monthly Reports

Daily Reports

During construction a daily supervisor's log will be prepared. Disposal and sampling documentation will be summarized as necessary. A Contractor's Quality Control Report will be prepared each day that field activities are conducted or material is delivered to the site.

As-built drawings will be maintained at the site by the site QC representative. These drawings will be updated as required for any deviation which has occurred.

Monthly Reports

Documentation of the Remedial Action activities and submittal of construction information to the USEPA will be accomplished by OHM's project manager submitting monthly letter reports by the fifteenth day of each month. The report format will include:

- Introduction
- Work Accomplished for the month
- Work Planned for the next month
- Problems and Solutions
- Waste Material Tracking

Monthly status reports in the form and content previously approved by LANTDIV will be submitted by the Program Office. Sections regarding progress, forecast, costs incurred, committed, delivery order modifications, waste tracking will be included. Schedules will be updated and variances explained.

In addition, documentation of conferences, i.e. pre-construction conference and mutual understanding meeting, will include at a minimum, the following: list of attendees, issues discussed, clarifications and special instructions.

2.4.1.2 Remedial Post-Construction Report

A Remedial Post-Construction Report will serve as a close-out report after the shake down period for the system. The report will be prepared and submitted within 60 days of the determination that the system is operational and functional. The report will include the following:

- The Inspection Report;
- Resolution of Punch list items from prefinal inspection;

- Certification that the system is fully operational and functional:
- Explanation of any and all changes to design. construction procedures, or operational procedures that occurred from the work plans:
- As Built drawings:
- Final Operational and Maintenance manual

As-built drawings will be delivered to the ROICC under separate cover by the CQC Representative with a copy of the completed submittal register. It is assumed that the as-built drawings will be distributed by the ROICC to appropriate parties upon approval of same.

An Operation and Maintenance (O&M) manual will be prepared for the remedial system. It will include startup procedures, sections dealing with operating instructions for the various equipment components and preventative maintenance requirements for the system. O&M manual will be finalized after a shake down period. This manual will be forwarded for review and approval under separate cover as per the distribution list developed by the MCAS Cherry Point Partnering Team.

2.4.1.3 Remedial Action Report

The purpose of the Remedial Action Report is to document the activities that occur on Operable Unit 02 and that the objectives of the basis of design have been accomplished. This report will include the following elements:

- Introduction
- Chronology of Events
- Performance Standards and Construction Quality Control
- Construction Activities
- Final Inspection
- Certification that Remedy is Operational and Functional
- Operation and Maintenance
- Summary of Project Costs

The above format will serve as the basis for development of the Site Close Out Report when the facility is contemplating deletion from the National Priorities List.

2.4.2 Data Management

Written correspondence and As-built Drawings

Written project information and correspondence for the remedial action will be prepared in Microsoft Word Version 6.0. As-built drawings will be on-site and will be updated as needed and as the schedule permits. Two sets of the red lined drawings will be submitted to the ROICC at the completion of the project.

Photographic Log

A photographic log will be maintained by the site superintendent. One complete set of photographs will be turned over to the ROICC. The other set will be forwarded to the project manager for inclusion in the project files.

Project Files

All project files including historical information, previous reports, remedial action documents will be maintained in accordance with the "Guidance on Administrative Records for Selection of CERCLA Response Actions," USEPA, Office of Solid Waste and Emergency Response, OSWER 9833.3A.

2.5 COMMUNITY RELATIONS SUPPORT PLAN

OHM will adhere to the Community Relations Plan for the MCAS Cherry Point, North Carolina, revision 2, dated January 1996, developed by Brown and Root Environmental. Section 8.0, Community Relations Plan Implementation discusses the roles and responsibilities of the various parties involved with the community relations activities at the MCAS Cherry Point.

OHM's project manager will provide updates on the remedial action at Operable Unit 02 to the Restoration Advisory Board for the MCAS when requested.

Typically, activities that OHM's project manager would be required to support include:

- Fact sheet review
- Public Meeting Support
- Coordination with MCAS Cherry Point Partnering Team

Community relations plan revisions would be performed by the facility or their designee.

Act ID	Orig Dur	Early Start	Early Finish	Activity
1000	1	15SEP97	15SEP97	Work Plan Submittal
1020	16	16SEP97	07OCT97	Government Review of Work Plan
1040	30	08OCT97	18NOV97	Revise & finalize Plans / Specifications
1030	40	08OCT97	03DEC97	Initial Procurement
1050	10	05NOV97	18NOV97	Government review
1070	1	04DEC97	04DEC97	Pre-Construction Meeting
1080	1	05DEC97	05DEC97	Project Mobilization
1060	304 *	05DEC97	15FEB99	Admin & Support
1100	10	08DEC97	19DEC97	Site Preparation
1120	10	22DEC97	06JAN98	SVE Header Piping Installation
1110	12	22DEC97	08JAN98	SVE Well Installation
1090	14	29DEC97	16JAN98	Electrical Installation
1130	6	09JAN98	16JAN98	Wellheads Installation
1140	6	19JAN98	26JAN98	SVE Blower Installation
1150	10	19JAN98	30JAN98	Start-Up & System Optimization
1135	1	27JAN98	27JAN98	T&D Debris / Waste
1160	252	02FEB98	27JAN99	Operation & Maintenance
1170	10	28JAN99	10FEB99	Site Teardown
1180	2	11FEB99	12FEB99	Site Restoration
1190	1	15FEB99	15FEB99	Project Demobilization

Start date	15SEP97
Finish date	15FEB99
Data date	15SEP97
Project name	17488
Page number	1A

SVE System Installation
Cherry Point, OU2 Site 10

OHM Remediation Services Corp.
OHM Project No. 17488

3.0 DESIGN BASIS AND CRITERIA

This section of the Work Plan provides the design objectives, proposed remedial technology, modification to technical specifications, rationale for equipment selection and sizing, supporting calculations, system operation for OU2, Site 10 soil remediation.

3.1 DESIGN OBJECTIVES

The design objectives for OU2, Site 10 were derived from Brown and Root Environment's Basis of Design Report dated April 1997. This report recommends vertical SVE wells to remediate four Hot Spot areas.

3.2 SELECTED REMEDIAL TECHNOLOGY

SVE was determined to be the best available technology for remediating soil at this site. Pilot test data and calculations derived by Brown and Root Environmental support this remedy. The Statement of Work specifications proposed a combination of vertical soil vapor extraction wells. Equipment selected by Brown and Root Environmental includes a positive displacement blower system for soil vapor extraction and vapor-phase carbon for treating the off-gases.

3.3 MODIFICATIONS TO TECHNICAL SPECIFICATIONS

To improve system performance, use existing equipment, and reduce costs. Brown and Root Environmental, OHM and LANTDIV personnel made suggestions to modify the Brown and Root design package.

As a result of estimate/scope negotiations with LANTDIV, several modifications to OU2, Site 10 specifications were modified and documented as presented in the John Franz letter dated June 25, 1997:

- Twenty-two, 2-inch diameter vertical soil vapor recovery wells will be drilled to depths of 16 to 18 feet below land surface with 5 feet of screened interval. The purpose of these vapor recovery wells is to remediate soils near source areas and recover volatile hydrocarbons. Fourteen existing wells from Hot Spot No.3 will be added to the SVE unit. Prior to startup, 6 borings for the purposes of soil sampling will be completed at the perimeter of each of the four Hot Spots (24 borings total).
- The interconnecting piping network from the equipment compound to each of the vapor extraction lines will be placed above grade. Header piping from each well will be open to the atmosphere. Piping near the equipment compound will be placed below grade to allow vehicle traffic to follow normal flow patterns. Piping that will cross Turkey Gut will be supported with a treated wooden frame. Distribution piping will be field routed to minimize the amount of clearing and grubbing.

A rain barrier will be installed at each Hot Spot to minimize the amount of water collected in the distribution piping.

- No sound reduction equipment will be installed other than the discharge silencer. No heat tracing or insulation of piping or tanks will be provided. The existing fence will secure the site.
- A heat exchanger will not be used for this project. To minimize capital costs, the carbon will be placed downstream of the liquid/vapor separator and upstream of the inlet to the SVE blower to eliminate the need for the heat exchanger.
- A single SVE unit will be used for all four Hot Spots. An overhead electrical drop will be made to provide electricity to the unit.
- Vapor-phase activated carbon treatment will be provided during startup only. A single 1,000 to 1,800 pound carbon cell will be provided.
- Air Dispersion Modeling has been conducted. Based on the concentrations of contaminants from the pilot plant study, carbon is not required for this project. The stack will be placed a minimum of 200 feet from the nearest fence line.
- Automatic restart controls will not be included to automatically restart the system after power interruption.
- A telephone auto dialer will not be provided to remotely notify operating personnel in the event of a system failure.
- Table 3.1 presents pilot test design parameters, original design specifications, and alternate specifications.

3.4 EQUIPMENT AND MATERIALS SELECTION

This section provides detailed information of the particular elements of the system along with rationale for equipment selection. Included as a part of this section are Tables 3.1 3.2, and 3.3. Table 3.1 summarizes key design parameters for the SVE systems, while Table 3.2 includes equipment specifications for the SVE system. Table 3.3 provides the stack discharge criteria when the SVE unit should be shut down until the off gas treatment system is modified.

SVE Wells and Piping System

Each SVE well will consist of a two-inch diameter, schedule 40 PVC riser and include five feet of 0.020 flush threaded schedule 40 PVC slotted well screen. These vapor recovery wells will utilize vacuum to recover volatile hydrocarbons from the soil. The SVE wells will be installed above the seasonal high groundwater table. Figure 8 shows the typical well construction detail.

A 20 mil HDPE liner will be placed over each Hot Spot area. The liner will be used to prevent rain water from entering the areas influenced by the SVE vacuum. By minimizing water collected in the vacuum system, water disposal to the IWTP will be minimized and water in the distribution piping will be minimized.

SVE header piping from Hot Spots 1, 2, 3, and 4 into the equipment compound shall be six-inch diameter schedule 40 PVC. Piping from the individual wells to the header piping will be two-inch diameter schedule 40 PVC. The piping has been sized to minimize pressure drop to the equipment compound and meet performance requirements. Piping for each of the Hot Spots is shown in Figures 2, 3, and 4. The plan view of the total SVE distribution piping, which terminates at the vapor/liquid separator inlet is shown on Figure 5. As needed, the header piping in low laying areas will be tapped for installation of water drain lines.

The SVE wells and header are designed to handle the designed 20 acfm of hydrocarbon contaminated vapors at 4 inches of Hg vacuum from each of the extraction wells.

SVE Blower and Vapor/Liquid Separator Skid

A rotary lobe positive displacement blower was selected to supply vacuum to the soil vapor extraction system. This unit is capable of approximately 1000 cfm at 15 inches of Hg and was selected based on design specifications and sizing calculations performed by OHM (see Table 3.2 for design specifications).

Primary components of the skid-mounted positive displacement blower system includes:
75 HP, 480V, 3-phase electric drive motor, instrumentation, interconnecting piping, stack, discharge silencer, gauges, valving, main control panel with disconnect, and controls. This positive displacement blower will be capable of delivering the specified vacuum and flow to the individual SVE wells. Expected noise levels from the rotary lobe blower on the SVE skid are 110-dB at a three foot distance from the skid unit. The unit will be located 100 feet from existing fence line and 400 feet from Onslow Road. Weather protection or sound attenuation will not be provided with the unit.

A minimum of a 100-gallon baffled vacuum vessel, which includes at least a 50 gallon reservoir for liquid storage, will be used to remove entrained liquids from the SVE gas stream. A 2 HP pump will be used to pump out entrained liquid from the vapor/liquid separator to the liquid holding tank upon demand. The pump will operate and shut down based on set points from a three level switch.

Liquid Holding Tank

A 2,000 gallon double walled holding tank with a high level alarm/switch will be provided to temporarily store entrained separator water from the integrated system. The tank has been sized to accumulate condensate for 1 to 2 weeks before emptying. This liquid holding tank is located on the equipment pad, adjacent to the skid-mounted equipment. A high level alarm/switch will notify the operator when the tank has reached its capacity and will shut down the system. The 2,000 gallon holding tank will be pumped into a tanker truck and the liquids will be transported to the IWTP for treatment in the existing Groundwater Treatment Plant. The holding tank and related piping are not heat traced or insulated. During long-term freezing conditions the SVE unit may be shut-down.

Well Heads, Vaults, and Instrumentation

SVE well heads will include a ball valve, vacuum gauge, a sample port, and a flow port for measuring air flow rates. Figure 6 shows the proposed detail for SVE and air sparging well heads.

Vapor -phase Carbon Adsorption Vessels

Vapor-phase carbon will be provided as requested by LANTDIV for the SVE system startup only. A single cell carbon system has been sized to treat VOC emissions prior to discharge to the atmosphere.

The single carbon cell contains approximately 1,000 pounds to 1,800 pounds of vapor-phase granular activated carbon media. The carbon cell will be placed on the vacuum side of the SVE unit. The carbon vessel must withstand a vacuum of 15 inches of Hg. When the carbon is spent, the carbon vessel will be removed. The SVE unit will then discharge directly to the atmosphere through the stack.

Discharge Stack and Dispersion Modeling

Gases from the SVE unit will be discharged into the atmosphere. A 20-foot high stack be used prior to discharging exhaust fumes into the atmosphere. The stack will be eight-inch in diameter and will be located approximately 100 feet north of the equipment compound. Initial discharge piping from the SVE blower will be made of Schedule 10 carbon steel because the discharge gases from the SVE unit could exceed 250°F when the system is operating at high vacuums.

Dispersion modeling was conducted to determine if off-gas treatment is required for operation after start- up. Dispersion modeling results are presented in Appendix G. "SCREEN3", a computer model was used to estimate the maximum receptor height at approximately 5-feet. Table 3.3 shows the critical concentrations in the discharge stack when the SVE system needs to be shut down and off-gas treatment needs to be added to the project. The SVE system will be started up so no more than 50% of the maximum stack concentrations for each VOC. At 50% of maximum concentrations at the stack, operating parameters will be adjusted to lower the emission rates. The sampling and plan in Appendix A addresses the stack sampling.

It should be noted that odor control is not addressed. Extracting gases from the landfill could cause concern. The stack has been placed away from populated areas to address the possible odor problems.

Equipment Compound

The SVE unit with vapor/liquid separator will be delivered to the equipment compound mounted on a steel skid. The approximate dimensions of the steel skid is 163"x 102". A six-inch thick gravel pad will be created to provide an area for the SVE unit, carbon units, and as a driveway for the vacuum truck to remove water from the water storage tank (see Figure 7 for equipment configuration). Remediation equipment will be anchored and grounded.

3.5 PERMITS

OHM will obtain the following construction permits/approvals required for the performance of the project:

- Prepare well permits
- Prepare excavation permits
- Prepare air registration for SVE unit

OHM will retain photocopies of all permits on site with work plans and as-built drawings. OHM will not be providing an Air Quality/Air Emissions permit for construction or operation of the VE and air sparge systems.

3.6 SYSTEM CONTROL LOGIC

Instrumentation and controls for the SVE system are based on control relays and contacts for monitoring and system control. All control devices on the SVE as designed are of industrial grade and provide appropriate operating ranges/seals. The process and instrumentation diagrams (P&IDs), shown as Figure 6, delineate the instrumentation and controls for this system.

Vapor/liquid separator - The vapor/liquid separator shall be equipped with a three position level switch. The switch low and high positions shall initiate and terminate transfer pump operation while the high- high positions shall initiate an alarm condition with SVE equipment shutdown.

SVE Transfer pump - The water transfer pump shall be controlled by a hand-off-auto switch located on the main control panel. In the auto position, the pump shall be controlled by level switches located in the vapor/liquid separator.

SVE Vacuum blower - Blower operation shall be controlled by a hand-off-auto switch located on the main control panel. In the auto position, blower operation shall be controlled by a discharge temperature switch, a discharge flow switch, and the vapor/liquid separator high-high switch. With the blower motor engaged, system shutdown shall occur with a high-high level alarm condition in the vapor liquid separator.

Water Storage Tank - The condensate storage tank will be provided with a high level switch to indicate that the tank is full, which will shut down the vacuum blower per the process and instrumentation diagram.

Table 3.1
Preliminary Design Parameters for SVE System
OU2, Site 10

Design Parameter	Pilot Test	Design Specification	Recommend	Comments
VAPOR RECOVERY SYSTEM				
Number of Well Fields	-	4	4	
Number of Wells	-	36*	36*	
Number of New Wells		22	22	
Number of Existing Wells from Pilot Study		14	14	
Well Dia. (in.)	-	2	2	
Well Piping Material		PVC	PVC	
Well Screen Pipe Schedule	-	40	40	
Depth (ft)	-	Various*	Various*	Above seasonal high water table
Screen Interval (ft)	-	5	5	2' Minimum requirements
Slot Size (in)	-	0.020	0.020	
Pressure at each well (in. Hg.)	-3.5 to -5	-4	-4	Brown and Root Pilot Study
Flow per well (acfm)	17 to 25	20	20	
Radius of Influence (ft)	45	30	30	
Total Flow all Wells(acfm)	-	720	720	36 wells at 20 acfm at 4" Hg
Pressure needed at Blower (in Hg)	-	-	-8	
Total Flow at Blower (acfm)			1000	Calcs by OHM at 12" Hg, 36 wells
Number of SVE Skids		4	1	
Controls and Control Panel		NEMA 4	EXP	
Distribution Piping		PVC	PVC	SCH 40
Carbon for Startup (pounds)		3600	1500	
Barrier Material	Yes	No	Yes	Needed to minimize water from SVE unit rather than improve radius of influence of wells
Electrical Power Source		Generator	Overhead line	Reduce O&M Costs

[1] Hot Spot 1: 9 wells, depth 16 feet below land surface (bls)
Hot Spot 2: 9 wells, depth 18 feet bls
Hot Spot 3: 14 existing wells, depth unknown
Hot Spot 4: 4 wells, depth 18 feet bls

Table 3.2
Preliminary Equipment Specifications for SVE System
OU2, Site 10

Vacuum Blower and Motor	Capacity needed: 1000 CFM @ 15"Hg vacuum - MD Pneumatics 7017 or equivalent - Positive Displacement type - Service factor< 80% of max speed - 75 HP, 480 volt/3 phase/60 Hz, continuous Duty - EXP Motor - Spark resistant, weatherproof - Air inlet dilution valve - Skid mounted	Vacuum Blower Acoustic Enclosure	- Not Included
Vapor/Liquid Separator	- Minimum 100 gallon Baffled vacuum Vessel - Centrifugal type knockout tank - 99% efficiency - Removable demister - Chemically resistant to petroleum products, gasoline, diesel - Steel construction. Rated at full vacuum service - Automatic 3 point intrinsically safe level controls, LSL, LSH, and LSHA - Clear PVC sight glass, side mounted - 2" dia. Liquid outlet w/brass check and ball valves - Accessible cleanout port, strainer	Main Control Panel	- Hand/off/auto switches for SVE blower and transfer pump - NEMA 7 construction - Relays for interface with other components
Liquid Transfer Pump Motor	- 2 HP Jabsco 30530 W/2 Pump - 480 VAC, 3 phase - Spark resistant - EXP Motor	Autodialer	- None Provided
Particulate Filter	- Particulate removal @ 98% or greater - 10 um or suitable size - Inline filter, Stoddard or equivalent - Reusable wire mesh	Electrical	- Branch circuits from motors/electrical equipment and all control wiring to terminate in a NEMA 7 enclosure. - No freeze protection of lines or equipment.

Discharge Silencer	- Burgess Manning Model BMSS - Discharge silencer downstream of blower - Flanged connection, NASI B16 or equivalent	Discharge Stack	- Carbon Steel Construction . 8" diameter - Minimum 20' height above ground with supports - Sample port
Gauges	- Liquid filled pressure/vacuum gauges - 0-20 inches Hg range - See P&ID for location and number - Temperature gauges in Fahrenheit	Vapor-phase Carbon Vessel	- 54" diameter by 90" tall - Contains 1,000 lbs of carbon minimum
Liquid Holding Tank	- 2,000 gallon HDPE or metal tank	Heat Exchanger	- Not required - Carbon on vacuum side of blower

Table 3.3
Maximum Stack Concentrations for System Shut Down
OU2, Site 10
Cherry Point, North Carolina

Stack Flow = 950 acfm
Stack Height = 20 Feet

Contaminant	Max. Allowable Conc. At Stack (ppmv)	Action Levels for Adjusting Operating System	Minimum of TLV,PEL,REL (ppmv)
Vinyl Chloride	21.2	10.6	1
Chloroethane	2080.4	1040.2	100
Methylene Chloride	1040.2	520.1	50
1,1 Dichloroethane	2080.6	1040.3	100
1,2 cis Dichloroethene	4073.9	2037	200
Benzene	10.4	5.2	0.5
Trichloroethene	1040.9	520.4	50
Chlorobenzene	207.8	103.9	10
Ethylbenzene	2083.4	1041.7	100
Xylene (o&p)	2078.6	1039.3	100
Xylene (m)	2078.6	1039.3	100
MIBK	1040.6	520.3	50
Toluene	1037.5	526.8	50

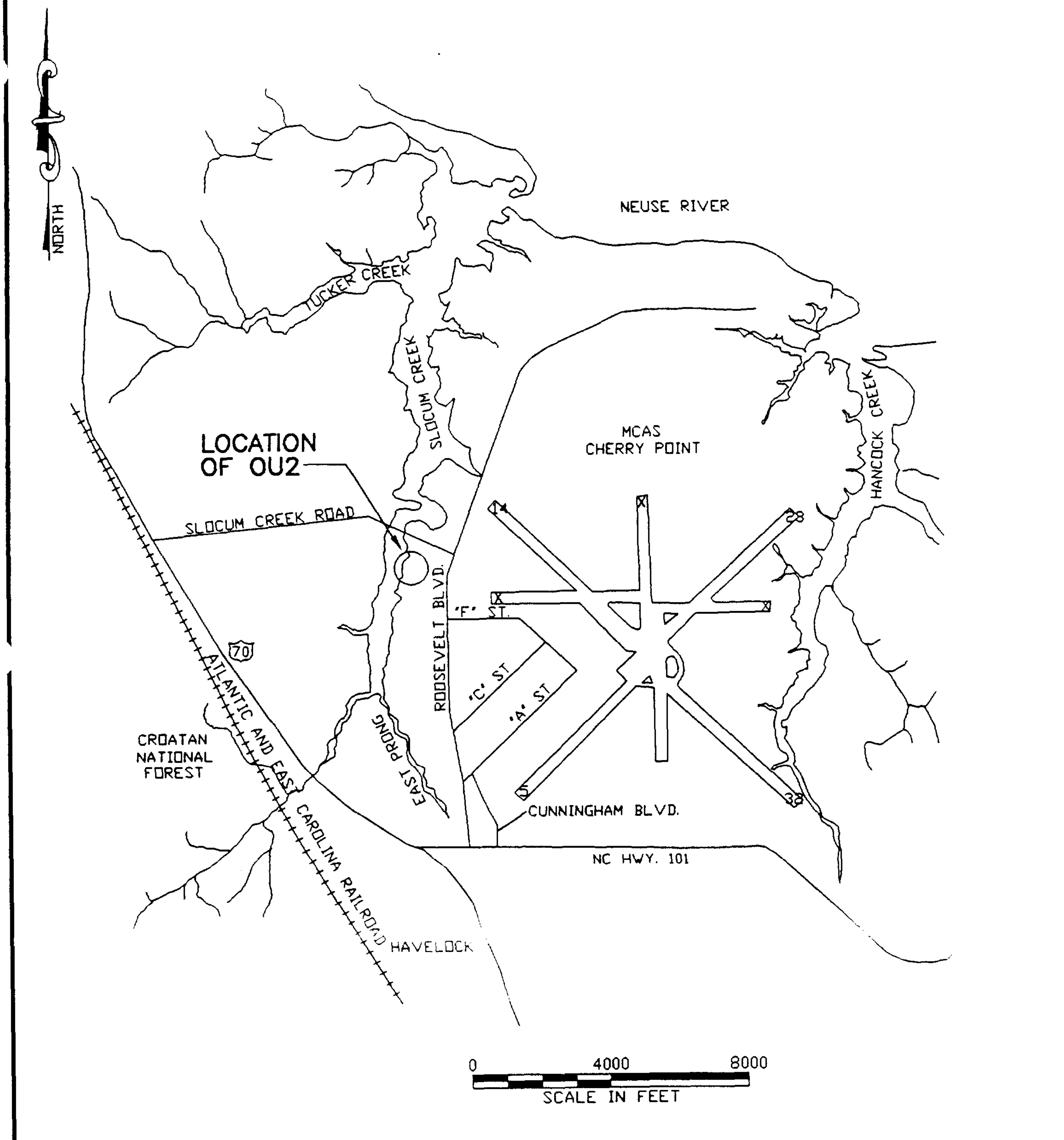
Note: The TLV/100 concentration for each contaminant was used as the maximum allowable dispersion concentration to calculate the maximum allowable stack concentration for each contaminant. Therefore, the maximum allowable concentration at the stack will result in a maximum allowable dispersion concentration that equates to the TLV 100 for each contaminant. The maximum allowable concentration at the stack for each contaminant will not be exceeded during system operation. An action level was established for stack concentrations for each contaminant that requires operating system adjustments when this action level is exceeded. This action level represents 50% of the maximum allowable stack concentration for each contaminant. By implementing these operating procedures, potential exposures of receptors int he vicinity of the stack will be controlled to concentrations not to exceed TLV/100 for each contaminant, with actions taken when 50% of these values are observed.

The calculation of maximum allowable concentrations at the stack are provided in Appendix G. The computer model"Screen 3" was used to model maximum allowable stack concentrations and calculate the maximum modeled dispersion concentration. A dispersion factor was calculated for each contaminant based on the maximum modeled dispersion concentration for each contaminant. This dispersion factor was approximately 2,114 for ech contaminant. By multiplying the TLV by 100 and dividing by 2,114, the maximum allowable stack concentration for each contaminant was calculated and provided in Table 3.3.

4.0 DRAWINGS

Several construction drawings which have been referred to earlier, have been developed based on the OHM's understanding of the scope of work for OU2, Site 10. The following list of drawings and provides sufficient detail for constructing the proposed remediation system at the site. Some modifications to the construction drawings presented (i.e. equipment layout, P&ID, etc.) are pending based on SVE unit that will be available from the OHM fleet of equipment. Each of the drawings are also referenced in Section 5.0, during the discussion of installation tasks.

DRAWINGS



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APPROVED BY	G. GILLES	8/22/97
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FIGURE 1

VICINITY MAP
OU2-SITE 10

PREPARED FOR
CHERRY POINT, NORTH CAROLINA

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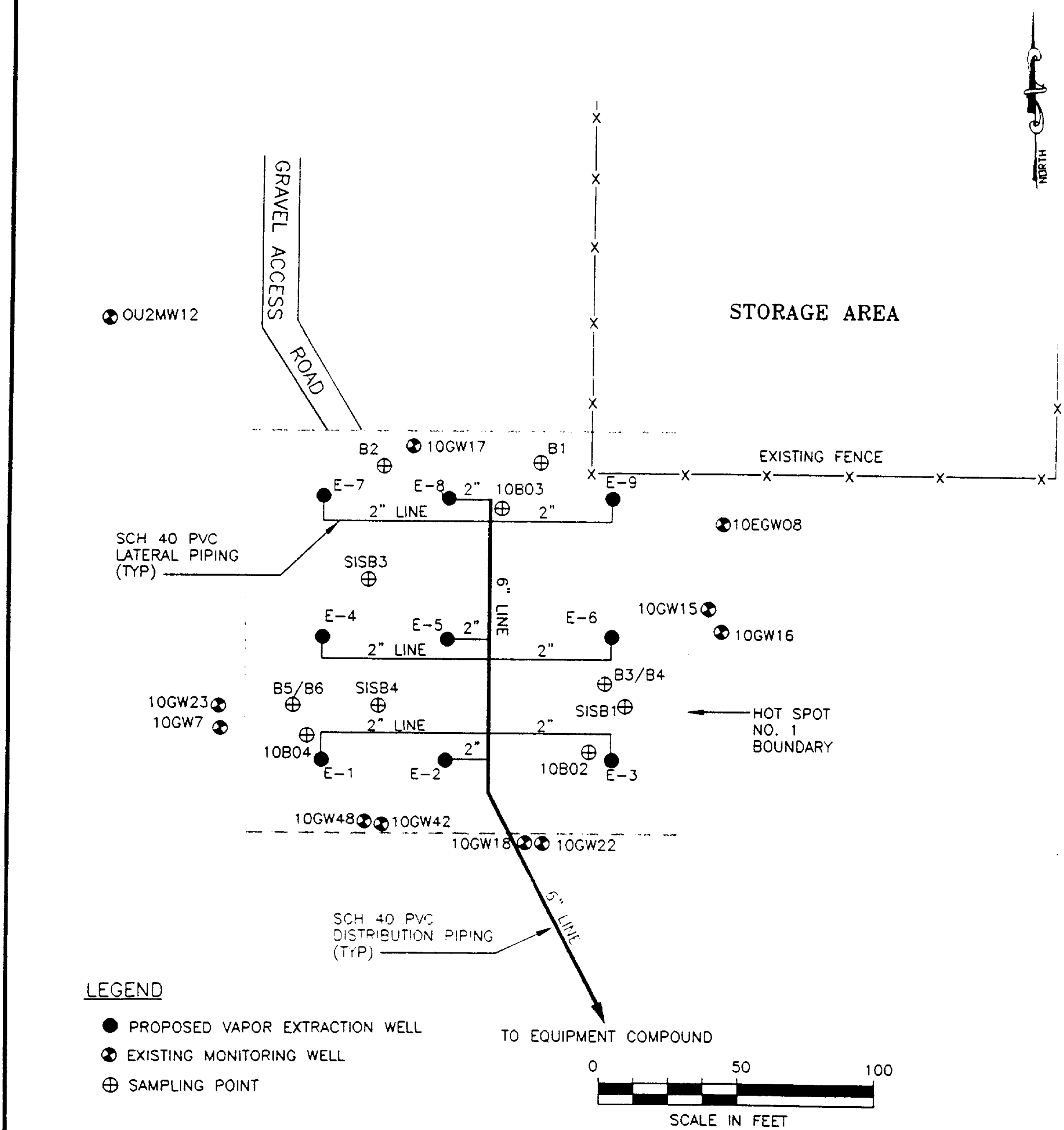

NOTE:
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FIGURE 2

HOT SPOT NO. 1
WELL AND PIPING LAYOUT
OU2-SITE 10

PREPARED FOR
CHERRY POINT, NORTH CAROLINA

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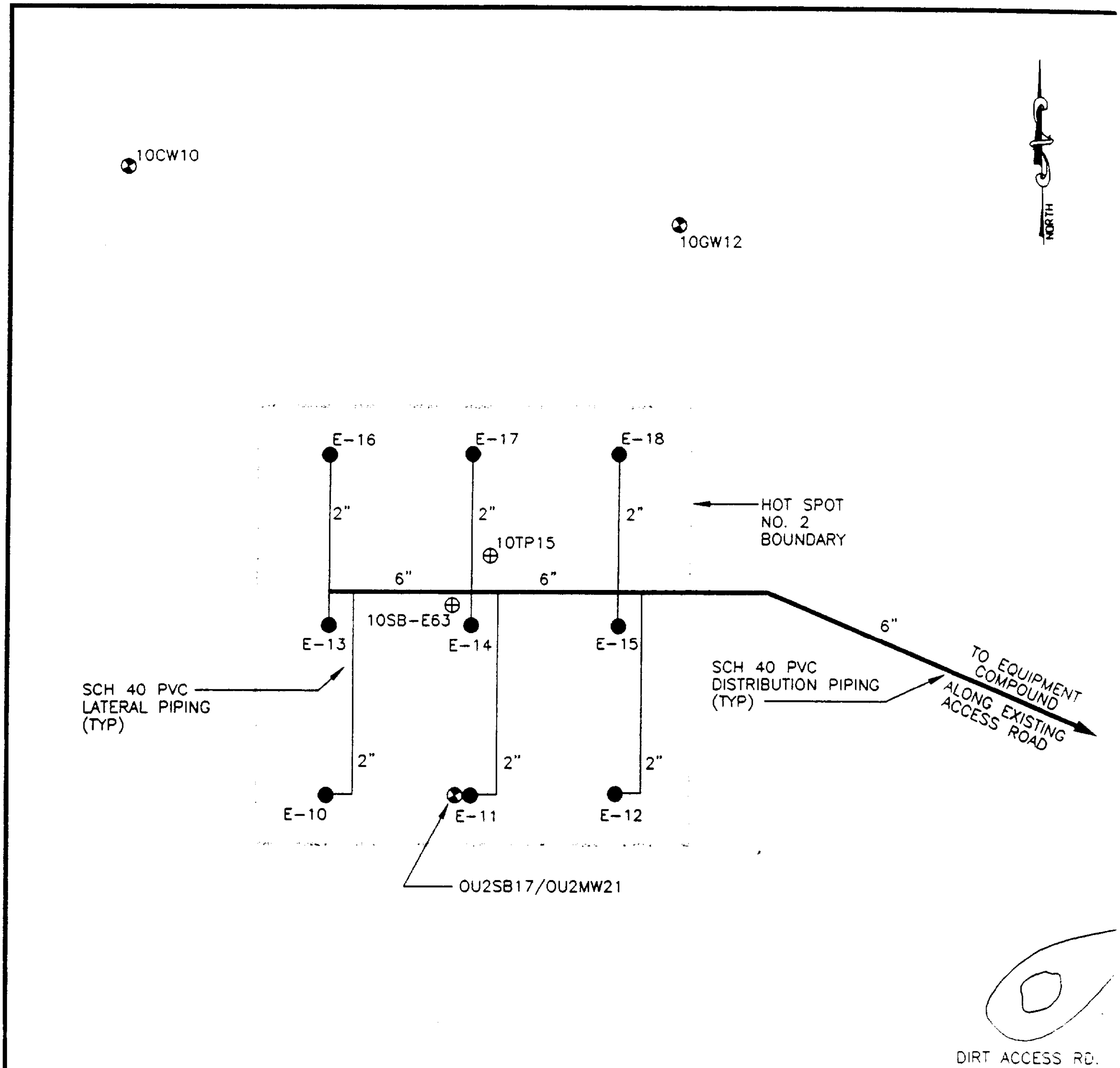

LEGEND

- ● PROPOSED VAPOR EXTRACTION WELL
- ⊗ EXISTING MONITORING WELL
- ⊕ SAMPLING POINT

0 50 100

SCALE IN FEET

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FIGURE 3

HOT SPOT NO. 2
WELL AND PIPING LAYOUT
OU2-SITE 10

PREPARED FOR
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G:\OHM2\CHERRY\ \FIG3

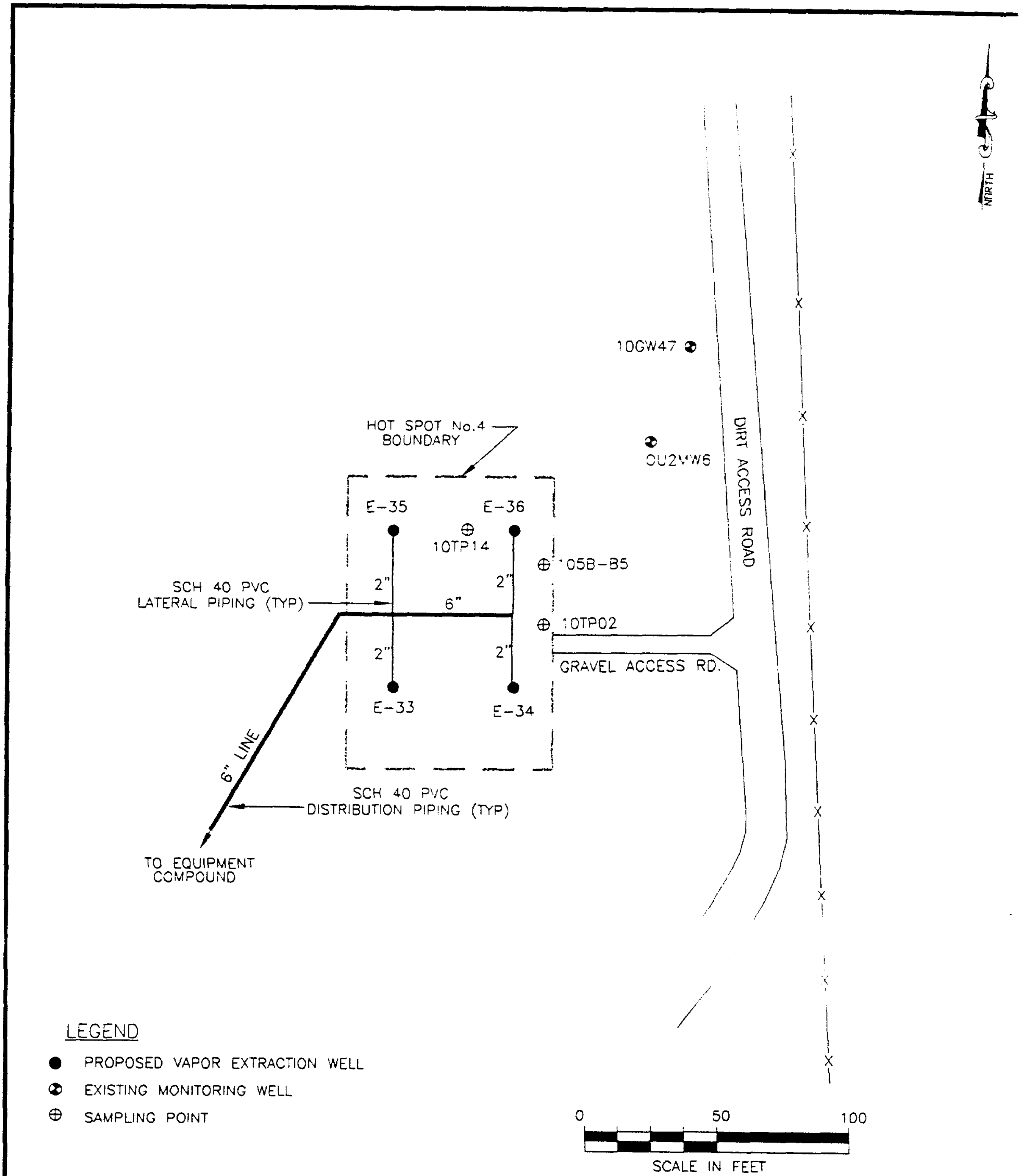

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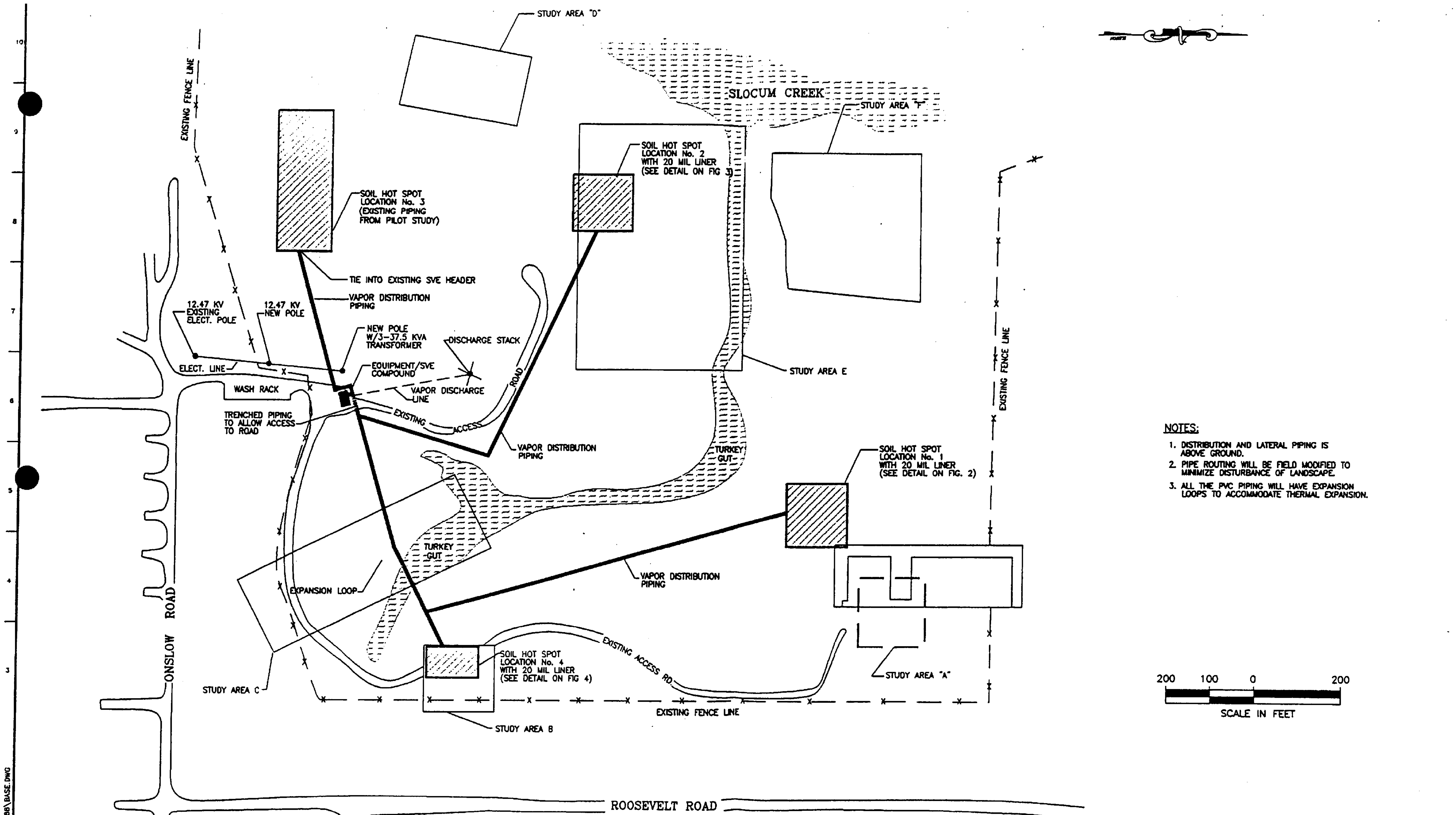
FIGURE 4

HOT SPOT NO. 4
WELL AND PIPING LAYOUT
OU2-SITE 10

PREPARED FOR
CHERRY POINT
NORTH CAROLINA

G:\OHM2\CHERRYPT\ \FIG1



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APPROVED: DEPT. MANAGER DATE:

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CADD FILE:
DRAWN: J. COLLINS
DESIGNED: F. HAAS
CHECKED: G. GILLES
CHECKED:

REVISIONS

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DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION NORFOLK, VIRGINIA
CONTRACT N62470-93-D-3032 DELIVERY ORDER NO. 0060
OHM PROJECT No. 17466 MARINE CORPS AIR STATION, CHERRY POINT, N.C.

FIGURE 5
SITE PLAN
AND
VE DISTRIBUTION PIPING
OU2-SITE 10
CHERRY POINT
NORTH CAROLINA

DRAWING NUMBER: —
SHEET NUMBER: of
DATE:

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UTILITY CONNECTION

PROCESS INLET	10" 150# SCH 40 FLANGE
PROCESS OUTLET	10" 150# SCH 40 FLANGE
CARBON CELL INLET/OUTLET	10" 150# SCH 40 FLANGE
KNOCKOUT TANK DRAIN OUTLET	1" SCH 40 CS
ELECTRICAL SERVICE ENTRANCE	200 AMPS, 480/277V, 3Φ, 60Hz

P-107
LIQUID TRANSFER PUMP
15.2 GPM
50 PSIG
2 HP

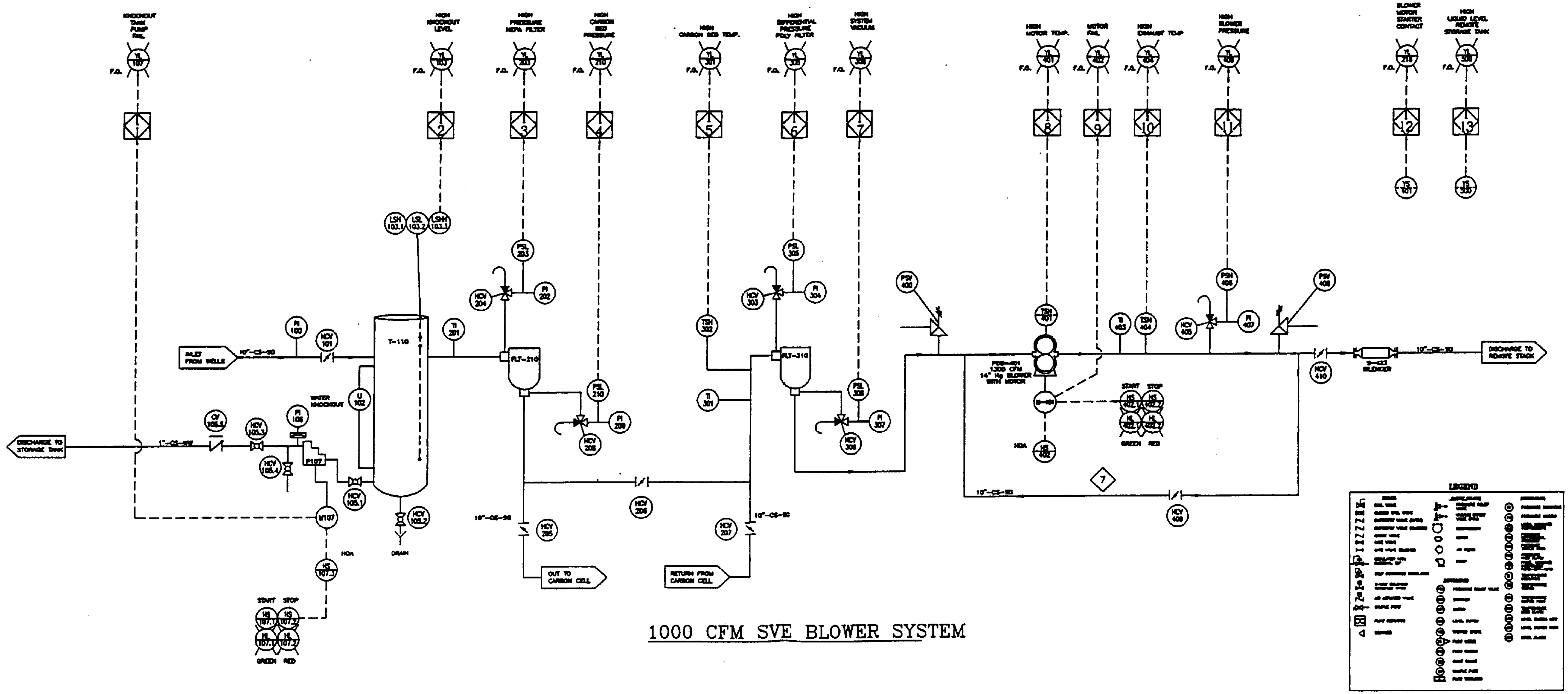
T-110
DEMISTER/
KNOCKOUT TANK
36" O.D. x 59"
50 GAL. CAP.

FLT-210
HEPA FILTER

FLT-310
POLY FILTER

PDB-401
PNEUMATIC BLOWER
1300 CFM
-14" Hg
2200 RPM
● 190°F TEMP. RISE

S-423
UNIVERSAL URD-8
32 dBa REDUCTION



1000 CFM SVE BLOWER SYSTEM

OHM Remediation Services Corp. Norcross,Georgia A Subsidiary of OHM Corporation	AT FULL SCALE	FIGURE 6
SUBMITTED: PROJECT MANAGER DATE:	CADD FILE:	SVE SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM OU2-SITE 10
APPROVED: SR. PROJECT ENGINEER DATE:	DRAWN: J. COLLINS	PREPARED FOR
APPROVED: DEPT. MANAGER DATE:	DESIGNED: F. HAAS	CHERRY POINT NORTH CAROLINA
	CHECKED: G. GILLES	
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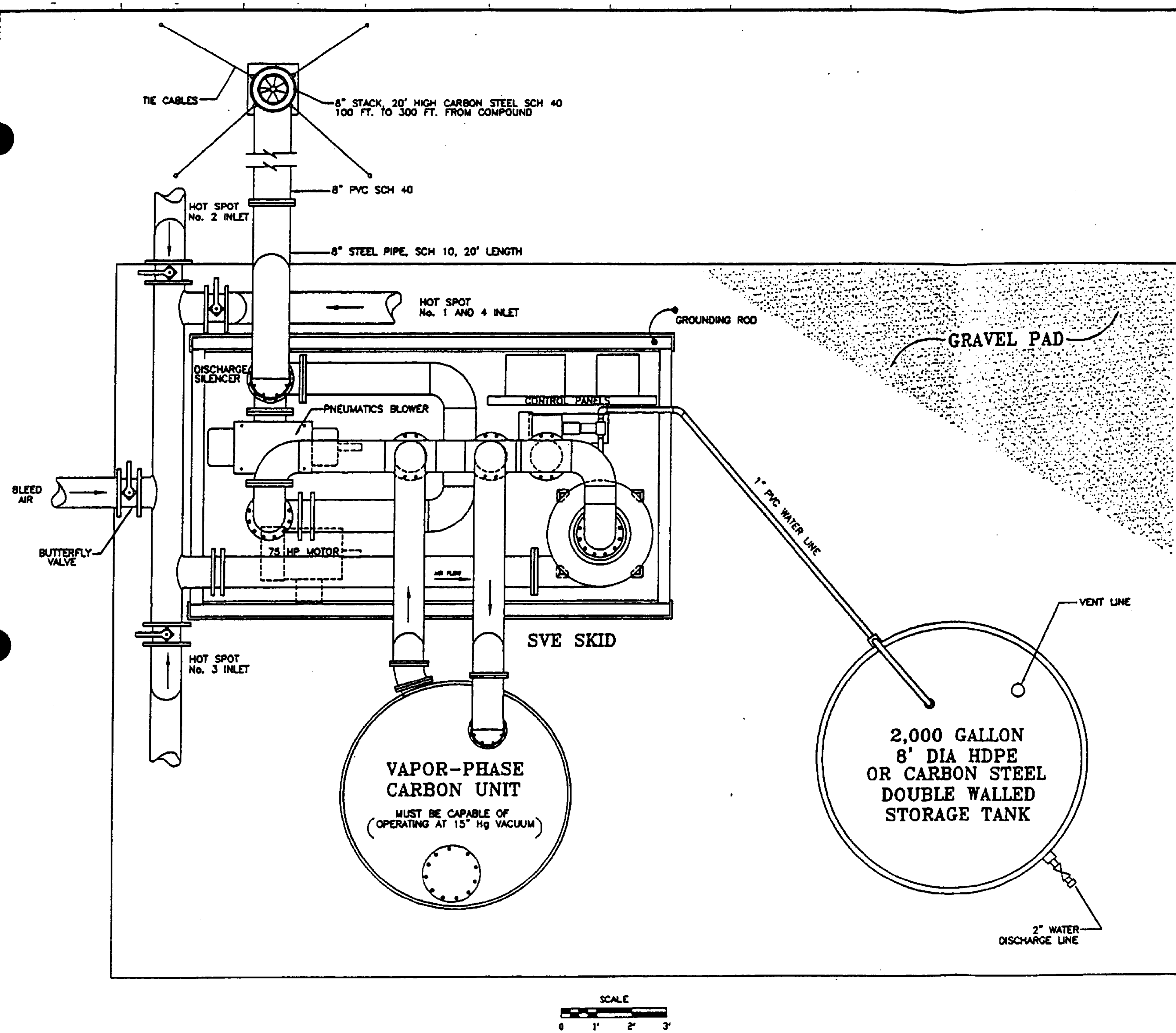
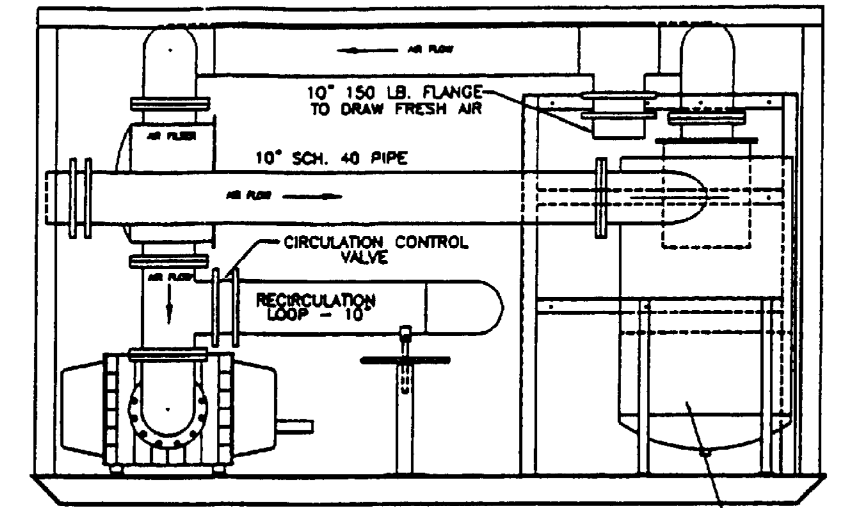
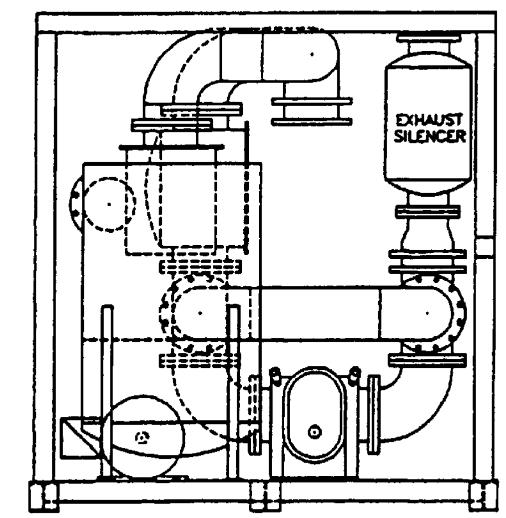




PLAN VIEW
N.T.S.



SIDE VIEW
N.T.S.

1000 CFM SVE UNIT
OHM UNIT #: 7541 & 7542
Approx. Weight: 14,000 Lbs.

BLOWER/MOTOR DRIVE PARTS:	PART NO.:
DRIVE SHEAVE (MOTOR)	T.B.WOODS: 5V 10.9 X 4-E
DRIVE SHEAVE (BLOWER)	T.B.WOODS: 5V 6.3 X 4-SK
BLOWER TAPER BUSHING	T.B.WOODS: SK X 2.375
MOTOR TAPER BUSHING	T.B.WOODS: E X 2.375
DRIVE BELT	T.B WOODS: 5VX1000
MOTOR SLIDE BASE	BROWNING: MB 365 T

29 LB.
18 LB
3 LB.
3 LB.
8 LB.
48 LB.

EQUIPMENT:	
BLOWER	MD PNEUMATICS: 7017-57B2 (10")
MOTOR (1760 RPM)	BALDOR: M-7068-T 75 HP (E/P)
AIR FILTER	STODDARD: F65-8 F8-139
SILENCER	UNIVERSAL: SU 8 ANNULAR FLOW
TRANSFER PUMP	JABSCO: 30530 W/2 HP EXP MOTOR
ELECTRICAL ENCLOSURE (E/P)	KILLARK: XJB-204010
ELECTRICAL ENCLOSURE (E/P)	KILLARK: EXB-12248
LIQUID LEVEL SWITCHES	WARWICK: 3218 E3A 3W2 321A
36" DROP OUT TANK	FMT MFG. DWG. NO.: 93-100-1T
SITE TUBE	SHURE SITE: 80661-VL1-8620-2-036-0-8-SS-SP

1275 LB.
1020 LB.
155 LB.
120 LB.
100 LB.
750 LB.
160 LB.
720 LB.

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FIGURE 7
EQUIPMENT COMPOUND AND DETAILS OU2-SITE 10
CHERRY POINT, NORTH CAROLINA

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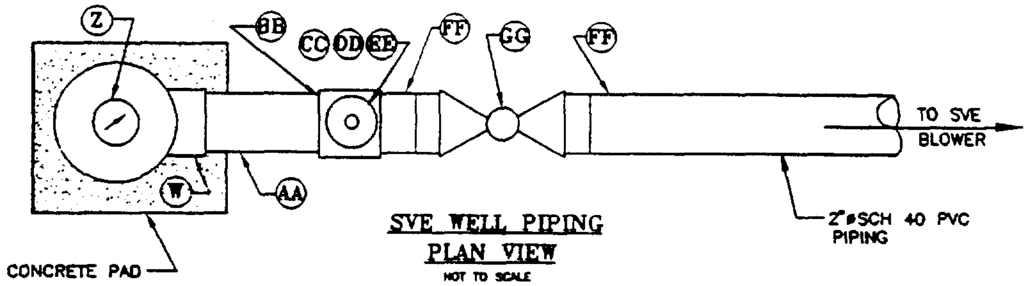
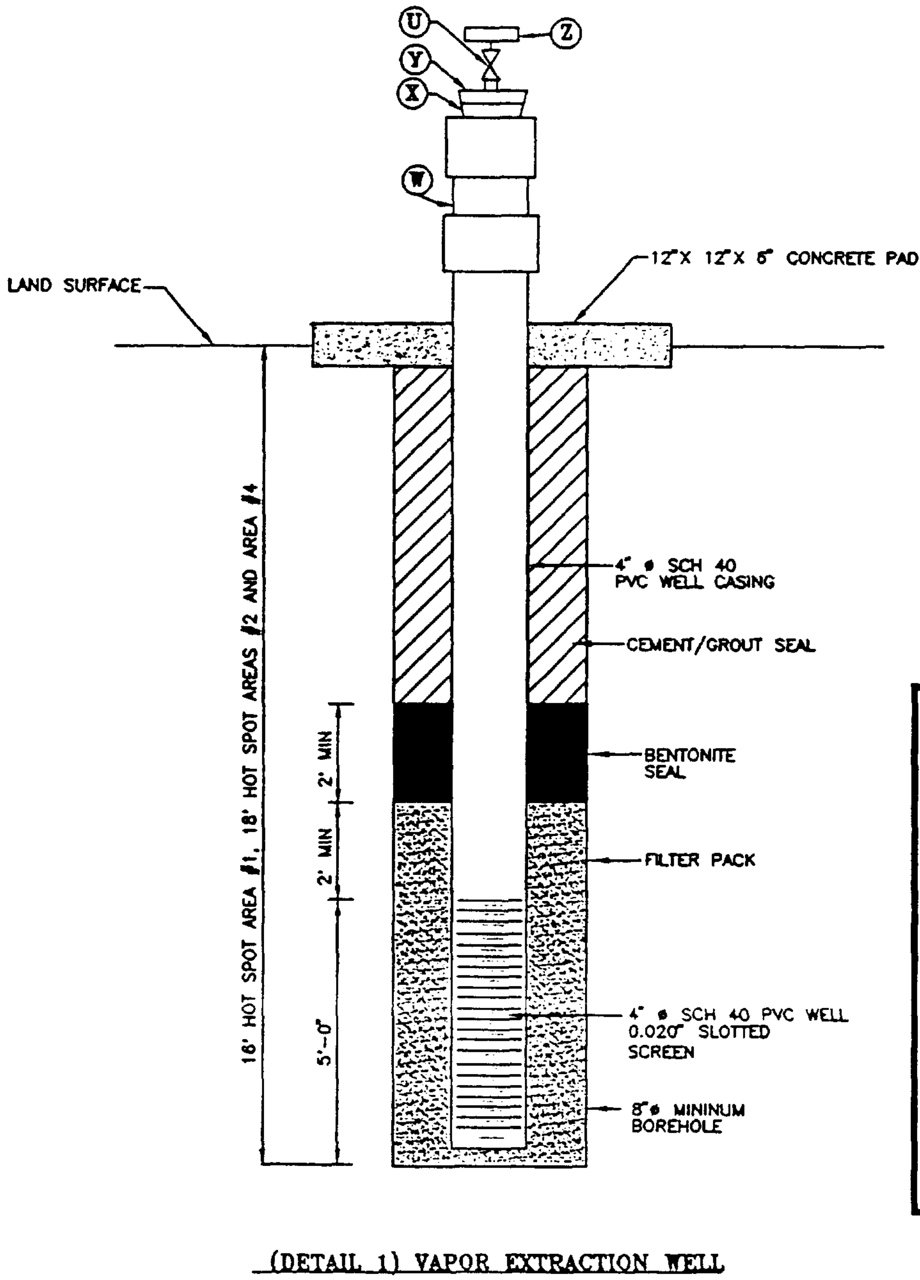


SVE WELL PIPING
PLAN VIEW
NOT TO SCALE



(DETAIL 1) VAPOR EXTRACTION WELL
NOT TO SCALE

1 VOIDS IN LANDFILL
2 CROSS CUT TO WELLS
3 PH GROUND WATER

PIPING LEGEND

U	1/4" GAUGE VALVE
V	STEEL VAULT BOX
W	4 X 4 X 2 (S X S X S) PVC TEE
X	4 X 2 (SPIG X SOC) PVC ADAPTER SCH 40 PVC
Y	2 X 1/4 (SPIG X FPT) REDUCER BUSHING SCH 40 PVC
Z	0-200 IN H20 VACUUM GUAGE
AA	SCH 40 CLEAR PVC
BB	2 X2 X 1/2 (S X S X FPT) REDUCING TEE
CC	1/2 X 1/4 (MPT X FPT) REDUCER BUSHING
DD	1/4" SCH 80 PVC PIPE NIPPLE
EE	1/4" BRONZE BALL VALVE
FF	2" SCH 40 PVC
GG	2" SCH 80 BALL VALVE

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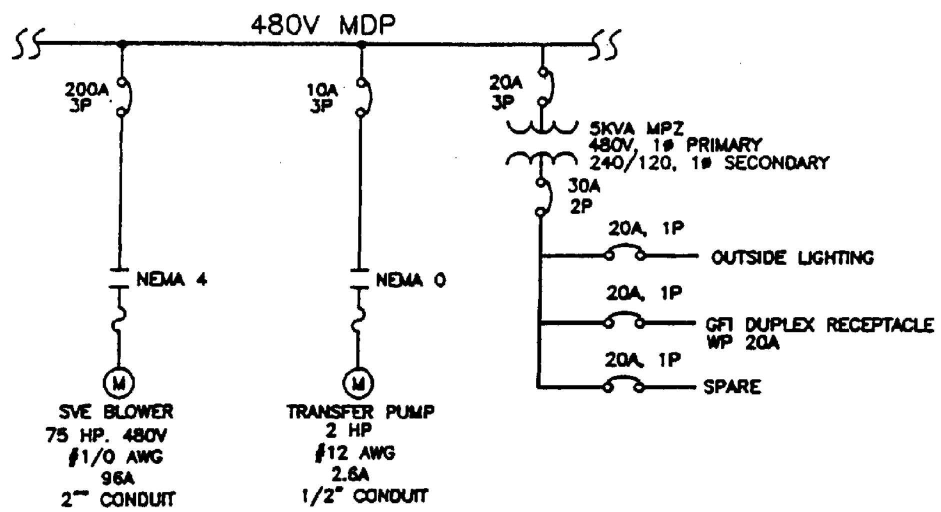
FIGURE 8

WELL AND WELL HEAD PIPING DETAILS
OU2-SITE 10

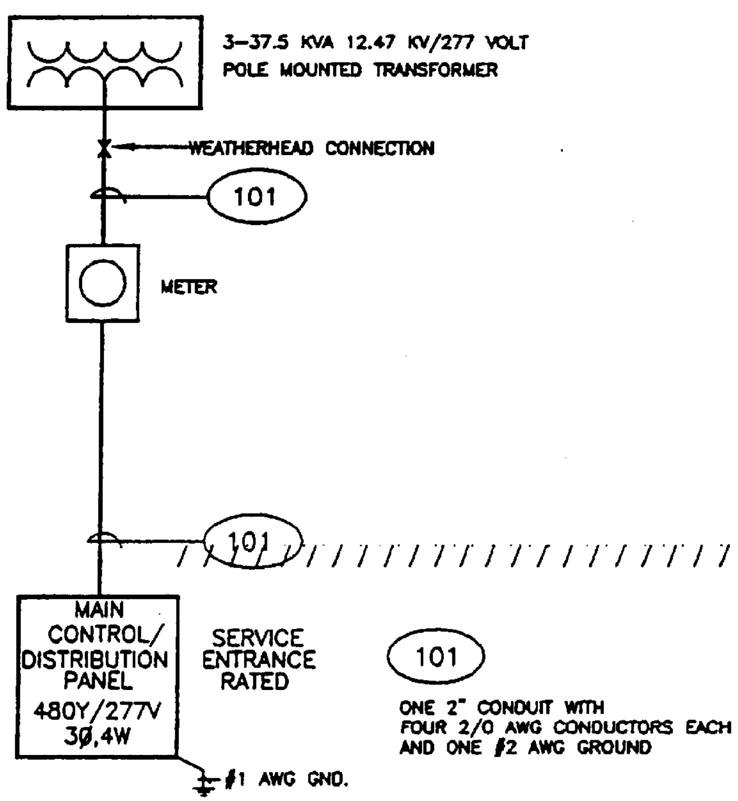
PREPARED FOR
CHERRY POINT
NORTH CAROLINA

G:\OHM2\CHERI 88\FIG7B.DWG



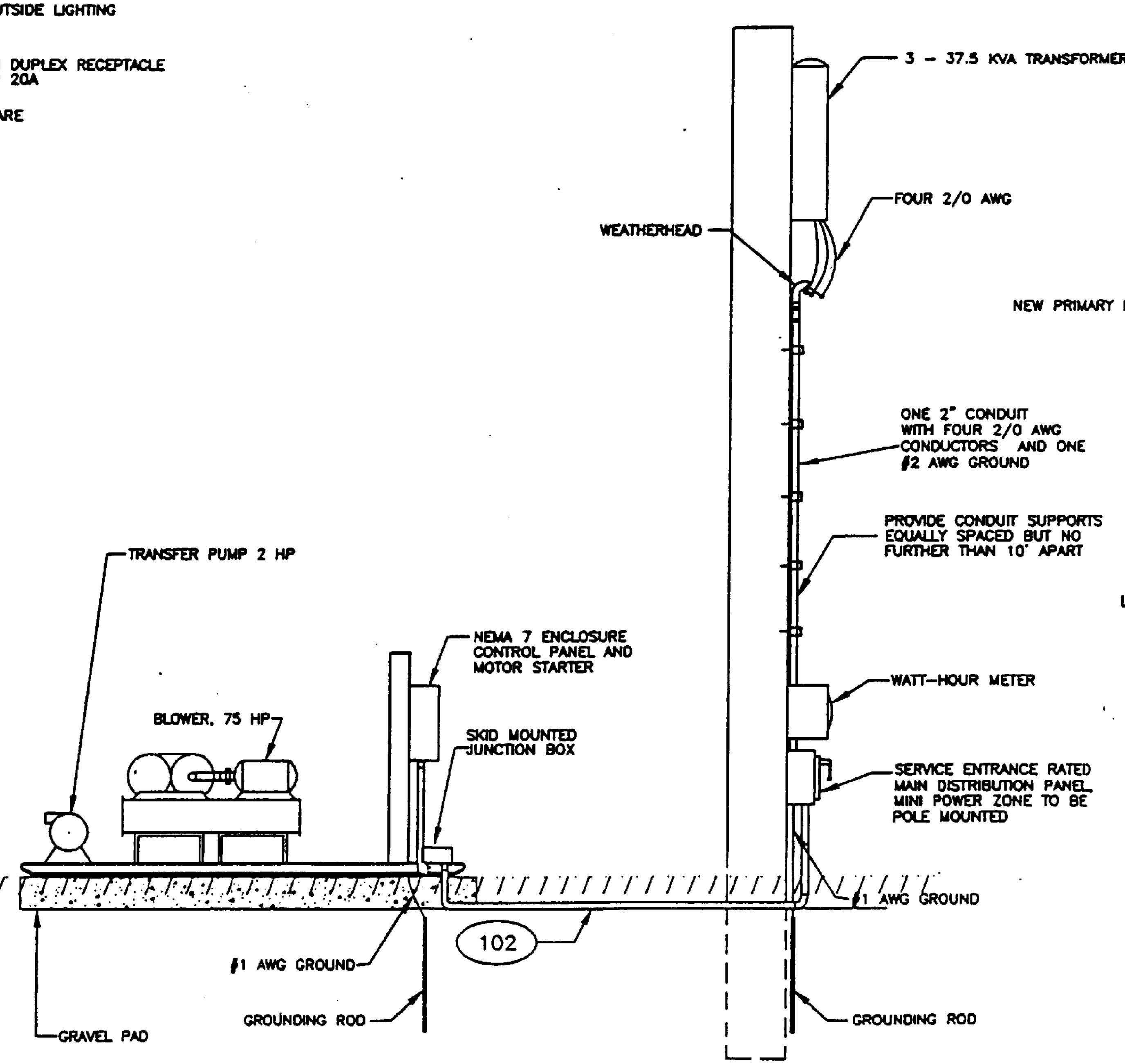
ONE LINE DIAGRAM

N.T.S.



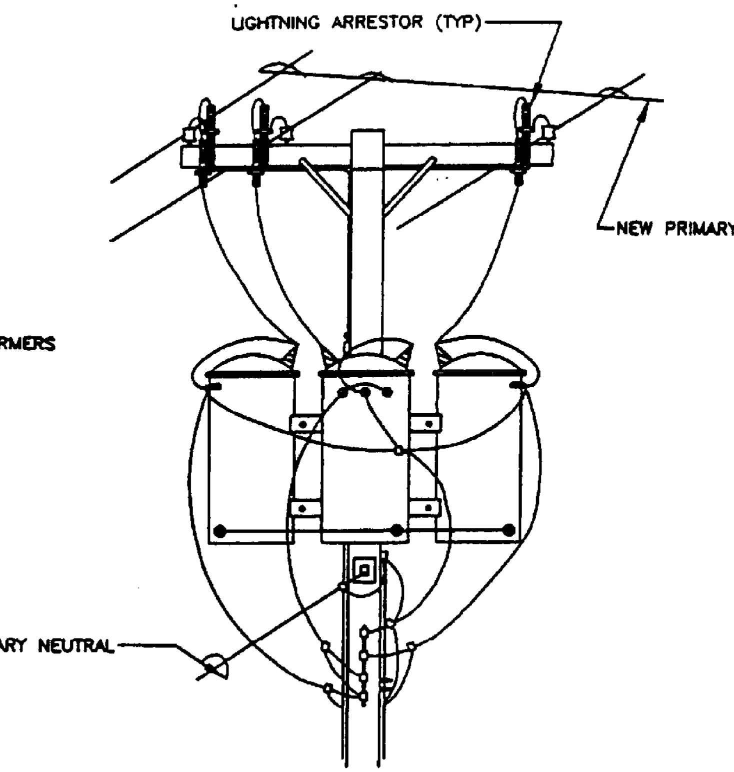
POWER DISTRIBUTION BLOCK DIAGRAM

N.T.S.



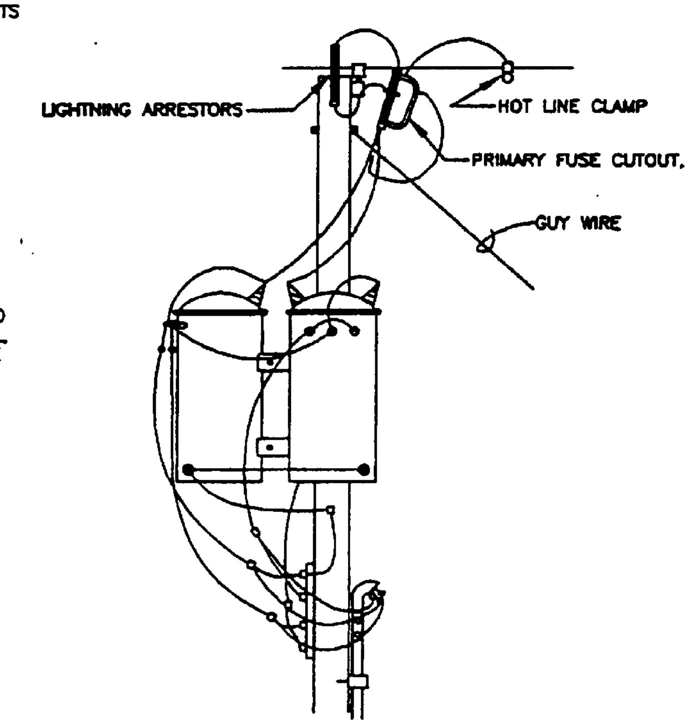
MAIN DISTRIBUTION PLAN

N.T.S.



ELEVATION

N.T.S.



SIDE ELEVATION

N.T.S.

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APPROVED:	DEPT. MANAGER	DATE:

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CADD FILE:
DRAWN: J. COLLINS
DESIGNED: F. HAAS
CHECKED:
CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	1	-	JC	8/22/97	

FIGURE 9

MAIN ELECTRICAL DISTRIBUTION DETAILS

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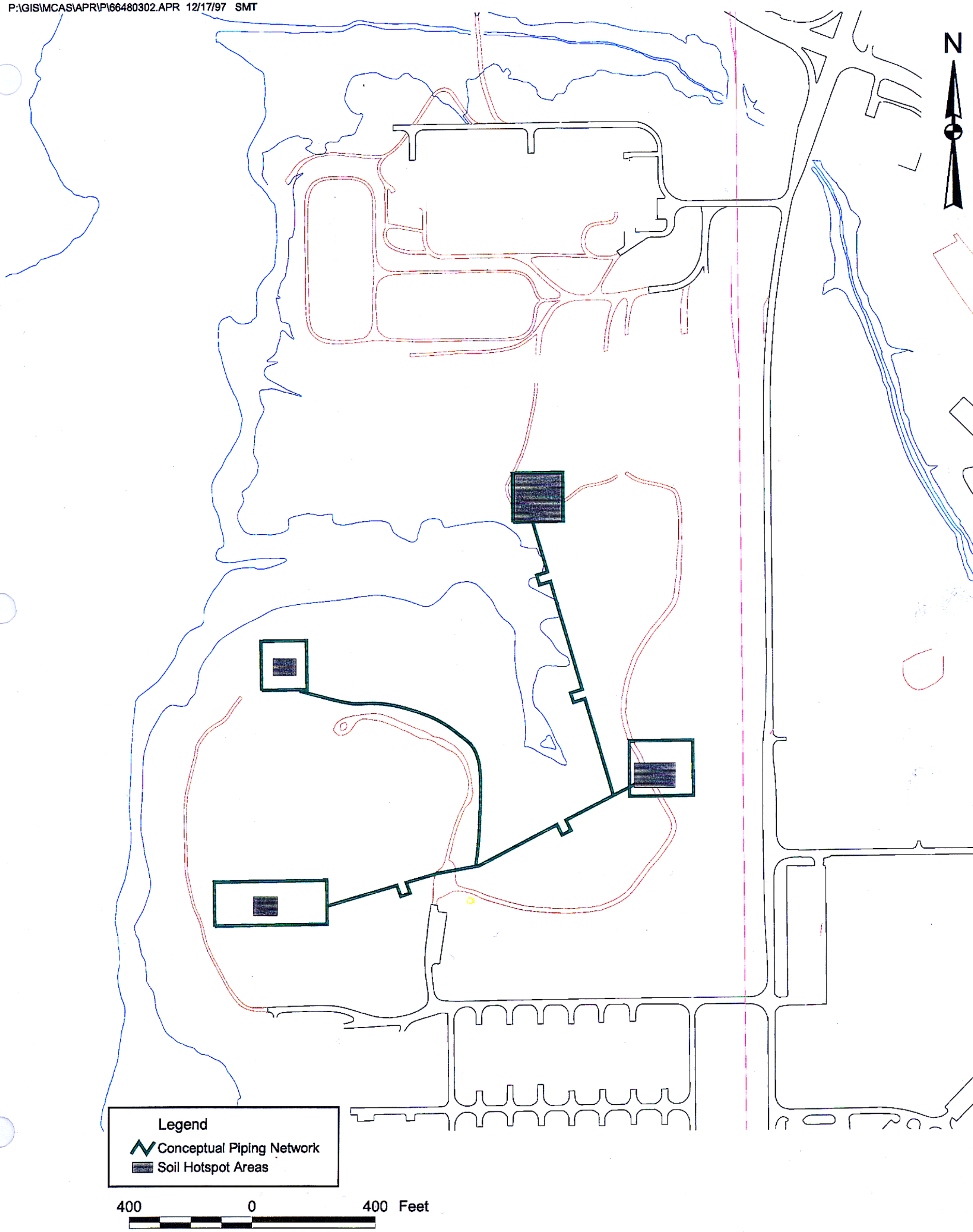
P:\GIS\MCAS\APR\P\66480302.APR 12/17/97 SMT



5.0 CONSTRUCTION TASKS AND METHODS

5.1 MOBILIZATION

Equipment and personnel to perform this remedial project will be mobilized to the site as required from other projects at MCAS Cherry Point, other project sites or regional offices in Gallatin, Tennessee, Norcross, Georgia and/or Clermont, Florida. Please see Figure 1 for the site vicinity map.

5.2 SITE PREPARATION AND SITE CLEARING/GRUBBING

The initial site preparation activities will include the delineation of the job site perimeter and work zones, location of all utilities within the project area, installation of overhead electrical lines, staking or marking the location of the equipment compound, improving access roads as required, and use of the existing security fencing to limit access to the site. Exclusion zones will be established in accordance with the health and safety plan and storage and laydown areas defined. Erosion and sedimentation control measures such as silt fence and hay bale placement will be instituted as required. To allow access to existing roads, the some PVC distribution piping will be below grade and encased in metal piping.

An attempt will be made to have a minimal impact on trees and grass areas by using above ground piping for most of the project. Trees that are located within the areas for header pipe will be cut and left for wild life. This activity will be coordinated with the Base. Grubbing shall be completed by OHM, as necessary.

5.3 WELL INSTALLATION AND SOIL BORINGS FOR SAMPLING

5.3.1 Well Installation

Upon completion of site preparation activities, a drilling subcontractor will mobilize a hollow stem auger rig to the site to commence installation of the soil vapor extraction (SVE) wells. An OHM hydrogeologist will be on-site during the well installation period to provide oversight. OHM personnel and drilling crews will be OSHA Health and Safety trained in accordance with CFR 1910.120. A dedicated OHM health and safety officer will be present during drilling to monitor conditions.

The SVE wells for Hot Spot Location No. 3 have already been installed. Information for Hot Spot No. 3 is presented in the Basis of Design Report for Operable Unit 2.

Hot Spot Location No. 1 will have 9 SVE wells installed, each to a total depth of 16 feet below land surface (BLS). The wells will be located as shown in Figure 4-2 of the Basis of Design Report for

Operable Unit 2, VOC Soil Hot Spot Remedial Design at Marine Corps Air Station by Brown and Root dated April 1997. A copy of this figure is reproduced in this work plan as Figure 8. In each boring, split spoon samples will be collected at depths of 5-7, 10-12 and 15-17 feet BLS. Hot Spot No. 1 well and piping layout is presented in Figure 2.

Hot Spot Location No. 2 will have 9 SVE wells installed, each to a total depth of 18 feet BLS. The wells will be located as shown in Figure 4-3 of the Basis of Design Report for Operable Unit 2, VOC Soil Hot Spot Remedial Design at Marine Corps Air Station by Brown and Root dated April 1997. A copy of this figure is reproduced in this work plan. In each boring, split spoon samples will be collected at depths of 5-7, 10-12 and 15-17 feet BLS. Hot Spot No. 2 well and piping layout is presented in Figure 3.

Hot Spot Location No. 4 will have 4 SVE wells installed, each to a total depth of 18 feet BLS. The wells will be located as shown in Figure 4-4 of the Basis of Design Report for Operable Unit 2, VOC Soil Hot Spot Remedial Design at Marine Corps Air Station by Brown and Root dated April 1997. A copy of this figure is reproduced in this work plan. In each boring, split spoon samples will be collected at depths of 5-7, 10-12 and 15-17 feet BLS. Hot Spot No. 4 well and piping layout is presented in Figure 4.

The lithology of all split spoon samples collected will be examined by the hydrogeologist and a description recorded in the field logbook. Each sample will be headspace tested in the field using a photoionization detector (PID). The sample from each boring with the highest PID reading will be appropriately packaged and shipped with a Chain of Custody to a fixed base laboratory for analysis. These samples will be tested for volatile organic analytes for TCLP volatiles by EPA Method 8260B.

All SVE wells will be constructed as shown in Figure 4-6 of the Basis of Design Report for Operable Unit 2, VOC Soil Hot Spot Remedial Design at Marine Corps Air Station by Brown and Root dated April 1997. A copy of this figure is reproduced in this work plan as Figure 8. Specifications include:

1 The wells will be constructed of Schedule 40 PVC, with 5 feet of 20 slot machine cut well screen installed above a 6 inch end cap placed at the bottom of the boring. A centralizer will be placed at the top of the well screen.
2 A clean quartz sand filter pack will be placed in the annulus from the base of the boring to at least one foot above the top of the screen. This pack will be sized so that it is retained by the screen and has a uniformity coefficient not to exceed 2.5.
3 A seal of bentonite pellets at least 2 feet thick will then be placed. The bentonite will be hydrated and allowed to set for at least 8 hours before any further well construction is performed.

4 A cement/bentonite grout will be placed from the bentonite seal to land surface. It will consist of Portland cement mixed with a maximum of 6.5 gallons of water per 94 pound bag of cement and 3 percent bentonite powder by weight. The grout will be allowed to harden for at least 24 hours before any further well construction is performed.

The driller will collect all drill cuttings generated during field work and place them in containers for later testing, transportation and disposal.

5.3.2 Perimeter Sampling

During SVE well installation, 6 borings will be advanced around the previously identified perimeter of each of the four hot spots (for a total of 24 borings). The exact locations will be determined in the field based on the best available data from field screening and analytical results. All borings will be advanced to 15 feet BLS. In each boring, split spoon samples will be collected at depths of 5-7, 10-12 and 15-17 feet BLS. The driller will collect all drill cuttings generated during field work and place them in containers for later testing, transportation and disposal.

The lithology of all split spoon samples collected will be examined by the hydrogeologist and a description recorded in the field logbook. Each sample will be headspace tested in the field using a photoionization detector. The sample from each boring with the highest PID reading will be appropriately packaged and shipped with a Chain of Custody to a fixed base laboratory for analysis. These samples will be tested for TCLP volatiles as presented in the SAP in Appendix A.

5.3.3 System Performance Sampling

Subsequent to system startup two soil sampling events will take place to examine system performance. The first will occur three months after system startup. Four borings each will be advanced at Hot Spot Locations 1, 2 and 4 (for a total of 12 borings). The exact locations will be based upon the results of the sampling during extraction well installation and perimeter sampling. All borings will be advanced to 15 feet BLS. In each boring, split spoon samples will be collected at depths of 5-7, 10-12 and 15-17 feet BLS. The driller will collect all drill cuttings generated during field work and place them in containers for later testing, transportation and disposal.

The data package collected during the long-term phase of the pilot-scale SVE system operation of hot spot 3 is presented in the Brown and Root Environmental Report dated August 1, 1997 and the Basis of Design Report, Section 3.2.1. As stated in the Basis of Design Report, it should be noted that there was a consistent reduction in the concentration levels of all contaminants.

The second sampling event will occur when there is reason to believe (based on effluent concentrations of volatile organic compounds) that soil action levels may have been achieved. Four borings each will be advanced at Hot Spot Locations 1, 2, 3 and 4 (for a total of 16 borings). The exact locations will be based upon the results of the previous sampling and analysis performed and available data from system performance. All borings will be advanced to 15 feet BLS. In each boring, split spoon samples will be collected at depths of 5-7, 10-12 and 15-17 feet BLS. The driller will collect all drill cuttings generated during field work and place them in containers for later testing, transportation and disposal.

During both sampling events, the lithology of all split spoon samples collected will be examined by the hydrogeologist and a description recorded in the field logbook. Each sample will be headspace tested in the field using a photoionization detector. The sample from each boring with the highest PID reading will be appropriately packaged and shipped with a Chain of Custody to a fixed base laboratory for analysis. These samples will be tested for volatile organic analytes by EPA Method 8260B.

5.4 DISTRIBUTION PIPING, AND WELL HEAD PIPING

OU2, Site 10 is currently a restricted area that has been fenced. This area will remain restricted during the life of this project.

SVE distribution piping will be installed above ground as indicated in Figure 5. Conventional trenching methods will be employed when required to run piping under the existing access roads. Trenching in traffic areas will be approximately 25 inches in width and 18 to 30 inches in depth. If shallow trenching is required, the PVC distribution piping will be inserted into a metal pipe to improve crush strength of the piping. For traffic areas only, piping will be field fabricated above grade and lowered into the trench. SVE piping will be schedule 40 PVC. PVC joints will be solvent welded.

Because this is a temporary system that will be installed for approximately one year, each SVE well head assembly will be above-grade without any housing as shown in Figure 8. Distribution piping will be above grade. All piping, valves, and instrumentation will be prefabricated to the greatest extent possible. SVE well heads will utilize primarily schedule 40 PVC construction. Piping in the well heads will be supported, if necessary, to reduce pipe stress.

5.5 EQUIPMENT COMPOUND INSTALLATION

5.5.1 Electrical Line Construction

To minimize costs associated with operating diesel powered generators, an electrical power drop will be brought in from Onslow Road across the street from the wash rack. OHM's electrical subcontractor will install two new electrical power poles and bring in primary power to the compound through the construction of a 12.47 kv aerial power line. Three 12.47 kv/277v single phase pole-mounted transformers will deliver a 480V, 3-phase service to the service entrance rated main distribution panel via an overhead service feeder. Figure 9 presents the main electrical distribution details.

5.5.2 Gravel Pad and Access Road Construction

A gravel driveway and gravel equipment pad shall be constructed. The gravel driveway and equipment pad will be sloped to match existing conditions.

5.5.3 SVE System Installation

OHM will coordinate delivery of the skid-mounted SVE to coincide with the installation schedule. The skid-mounted unit will be moved onto the gravel pad, then located within the equipment compound as shown in Figure 7. Complete piping runs will be field installed in accordance with Figures 2, 3, 4, 5, and 8. OHM will position and maneuver equipment skids to ensure they are level, piping runs are plumb, and all operations and maintenance panels are easily accessible.

SVE System equipment will be piped, shimmed, and leveled to ensure proper alignment and service panel accessibility prior to operation.

5.5.4 Vapor-Phase Carbon and Discharge Stack

Vapor-phase carbon is only required during the startup. The selected carbon vendor will deliver a single 1,000 pound to 1,800 pound vapor-phase carbon cell for installation by OHM. OHM will off-load and place the cell on the vacuum side of the SVE blower. When the initial carbon is spent, it is expected that additional carbon will not be required. A carbon steel discharge stack approximately 20 feet high will be installed to exhaust gases to the atmosphere. The stack will be remote from the equipment compound. Control of odors from the landfill vapors may be a concern after equipment startup. The stack will be supported with guy wires or in an appropriate manner. The proposed equipment arrangement is provided in Figure 7. The stack is not designed for hurricane conditions

5.5.5 Controls Installation and Electrical Distribution

The control panel will be NEMA 7 and will be mounted on the SVE skid. Hand/off/auto switches and alarm/run lights will be provided for all treatment system motors as shown in the process and instrumentation diagram in Figure 6. All push bottom stations, pilot and indicator lights will be heavy-duty. Prior to start-up, all electrical systems and equipment will be tested to ensure proper operation.

OHM's electrical subcontractor will install two new electrical distribution poles and construct a 480V, 170 amp service. Power will be distributed to the treatment equipment via the main distribution panel. Three 37.5 kva, 12.47kV/277V pole-mount transformers will deliver a 480V, 135 amp, 3-phase feed to the main distribution panel mounted on the service pole as shown in Figure 9.

5.5.6 Sign Installation and Restoration

Upon completion of all equipment, piping, and electrical installation, signs shall be placed on all sides of the fence stating "No Unauthorized Entry " into the equipment compound. In areas where grass/vegetation has died or is stressed, replanting, reseeding, or sodding may be necessary for site restoration.

5.6 SYSTEM START-UP

Site restoration and system start-up and operational activities will begin upon final completion of the equipment, piping, well head and electrical installation. The SVE system start-up and optimization will require approximately 10 days. Each Hot Spot area will be started separately. This will include testing, calibration, adjustment, and initial maintenance of the SVE blower, and ancillary process equipment and instrumentation. During this time, the system will be placed in full-scale operation. System start-up and optimization activities include:

- Develop, balance, and quantify air extraction rates and vacuum from each of the SVE wells
- Test and calibrate process controls and equipment including testing of critical alarms and system shutdowns.
- Quantify relative concentrations of the total hydrocarbons from individual SVE wells with field instrumentation to optimize system performance.
- Quantify total VOC emissions with the Sampling and Analysis Plan for the SVE system discharge.
- Perform baseline monitoring well sampling and analysis in accordance with the Sampling and Analysis Plan
- Optimize well flow rates and pressures

5.7 OPERATION AND MAINTENANCE

A sampling and analysis program will be developed and implemented to monitor and document system performance. This program will include collection and analysis of baseline and a first quarter soil samples.

Operation and maintenance of the system will be conducted by OHM for approximately one to two years. OHM personnel will visit the site routinely to monitor system performance and maintain the systems. During each visit, equipment operating parameters and well flow rates and pressures will be logged. Real time monitoring will be correlated to lab data. The system will be optimized for contaminant removal based on real time monitoring. Monthly sampling of the air discharge from the stack will be performed. The Sampling and Analysis Plan (Appendix A) for a schedule of the analytical parameters to be recorded.

Extraction wells will be left in place for any future bioremediation projects. Air can be added through the existing extraction wells.

6.0 REPORTING

Various reporting requirements are described in the project specifications. The following paragraphs discuss the reports OHM plans to prepare during the course of this project. Any other reports not mentioned in this section have not been deemed applicable to this project.

Environmental Conditions Report

Prior to starting any field activities at the project site, a ROICC and OHM representative will tour the site, take photographs and note any existing environmental conditions on or adjacent to the site. This report will be submitted on a contractor's production report form (Appendix D) with attachments as may be necessary.

Daily Reporting

OHM will prepare and submit daily Contractor's Production Reports and a Contractor's Quality Control Report each day that field activities are conducted or material is delivered for this project. It is anticipated that the site supervisor will perform the role of site QC manager during all periods when the designated site QC manager is not present at the job site.

As-Built Drawings

The two sets of contract drawings will be maintained at OHM's field offices at Cherry Point. These drawings will be updated by field personnel as required for any deviation which has occurred. Upon completion of field activities, OHM will incorporate all changes into the record drawings for the project. Record drawings will accompany the submission of the Remedial Action Report.

Monthly Status Reports

Monthly status reports in the form and content previously approved by LANTDIV will be submitted by the Program Office. Sections regarding progress, forecast, costs incurred, committed, delivery order modifications, waste tracking, government materials tracking will be included. Schedules will be updated and variances explained.

Remedial Action Report

Within 30 days of start-up, OHM will supply a Remedial Action Report (RAR) which will fully document the construction of the remedial system. This report will contain sections discussing a summary of the action with subsections dealing with submittals, sampling, well construction details and a summary of the field daily reports. Subsequent sections will include a final health and safety report, a summary of record documents, a discussion of field changes and contract modifications and a quality control summary. Appendices to the report will contain as-built drawings, photographic documentation and equipment warranties or guarantees, a copy of the testing log, field test reports as outlined in Section 2.5.1.3.

Remedial Post-Construction Report

A Remedial Post-Construction Report will be provided to document activities through the start-up and shake down period for the system. The report will be prepared and submitted within 60 days of the determination that the system is operational and functional. The report will include the As Built drawings, Final Operational and Maintenance manual, and all the other items as outlined and discussed in the Section 2.4.1.2.

7.0 REFERENCES

Brown and Root Environmental, Basis of Design Report for Operable Unit 2 VOC Soil Hot Spot Remedial Design at Marine Corps Air Station Cherry Point, North Carolina, April 1997.

Brown and Root Environmental, Operable Unit 2 Soil Vapor Extraction System Transmittal of Data, August 1, 1997.

Brown and Root Environmental, Marine Corps Air Station, Cherry Point, North Carolina Air Emissions Information for the OU1 and OU2 Treatment Systems, August 8, 1997.

OHM Remediation Services Corp., Contract No. N62470-93-D-3032, Delivery Order 0080, Proposal for SVE at Operable Unit 02, Site 10, MCAS Cheery Point, NC, OHM Project No. 17488, July 9, 1997.

Brown and Root Environmental, Data Gap Investigation and SVE Treatability Study Work Plan for Operable Unit 02, February 1997.

Brown and Root Environmental, Feasibility Study, April 1997

Brown and Root Environmental, Remedial Investigation - Vols. I - V, April 1997

Brown and Root Environmental, Pilot-Scale SVE System, July 1997

Brown and Root Environmental, Interim Measures Record of Decision, June 1997 (revised July 1997)

Brown and Root Environmental, Proposed Remedial Action Plan, July 1997 (revised August 1997)

APPENDIX E

TRANSPORTATION DISPOSAL PLAN

MATERIALS HANDLING, TRANSPORTATION AND DISPOSAL PLAN FOR THE CONSTRUCTION AND OPERATION OF AIR SPARGING AND SOIL VAPOR EXTRACTION REMEDIAL SYSTEMS OPERABLE UNIT 02, SITE 10 MCAS CHERRY POINT, NORTH CAROLINA

Submitted to:

Department of the Navy
Contract No. N62470-93-D-3032
Delivery Order No. 0080

Submitted by:

OHM Remediation Services Corp.
5445 Triangle Parkway, Suite 400
Norcross, GA 30092

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C. John Rhyne
Regional Transportation and Disposal Coordinator

Steven Bivone
Project Manager

OHM Project No. 17488

November 1997

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1.0 INTRODUCTION

This Materials Handling, Transportation and Disposal Plan (MHTDP) was prepared for use during Remedial Action activities to address the contaminated groundwater and soil at Operable Unit 02, Sites 10, ~~44A~~ 46, and 76 located on the Marine Corps Air Station (MCAS), Cherry Point, North Carolina.

The MHTDP objective is to specify the methods and procedures to be implemented by OHM to ensure that wastes generated during site activities will be transported, stored, treated, and disposed of in full compliance with applicable federal, state, and local rules and regulations.

All material will be disposed using applicable CERCLA regulations.

2.0 CHARACTERIZATION OF WASTESTREAMS

Based on the information provided to OHM in the Statement of Work and Delivery Order Plans and Specifications, OHM will generate various types of Remedial Derived Waste which will require off-site disposal. These materials are outlined in Table 2.1.

OHM will complete characterization and disposal analysis of the waste materials generated form the remedial activities. For the purposes of this plan, OHM assumes that contaminants of concern are petroleum-based hydrocarbons.

OHM will collect samples in accordance with the Sampling and Analysis Plan and perform appropriate characterization and disposal analysis of the wastes described in Table 2.1 during the course of these projects. Final characterization and disposal alternatives are contingent upon those analyses. An addendum to this plan will be prepared with that information when it is available.

Table 2.1 Remedial Activity Derived Waste from Air Sparging/Soil Vapor Extraction, Operable Unit 02, Site 10

Waste	Description	Quantity	Disposal Method
PPE	Personal Protective Equipment generated during on-site remedial activity	32 Drums	TBD on analytical results
Decon Water Drilling Fluids	Decontamination water from equipment cleanup; water from well development	100 gallons	Base Industrial Water Treatment Plant
Drilling Muds	Soil cuttings from well installation	16 cubic yards	TBD on analytical results
Trenching Spoils	Soil from SVE system piping	20 cubic yards	TBD on analytical results
Spent Carbon	Spent carbon from soil vapor extraction off-gas treatment	1,000 pounds	Regeneration by vendor
SVE Water	Water generated from the SVE process	2,000 gallons/ month (est)	Base Industrial Water Treatment Plant

3.0 WASTE DISPOSAL APPROVAL

OHM will assign a T&D Coordinator to this project who will report to the Project Manager as a single point-of-contact for all waste management activities. The individual assigned to this project will be familiar with all the applicable portions of RCRA, CERCLA and SARA regulations – especially 40 CFR 261 (Identification and Listing of Hazardous Wastes). In addition this individual will be familiar with the State of North Carolina regulations related to hazardous and solid waste treatment, storage, disposal, and transportation. This individual will specify analyses needed to identify hazardous wastes. Based on this data and consultations with the Department of the Navy representatives, the project T&D Coordinator will assist the Department of the Navy in identifying regulated waste materials. The T&D Coordinator will also be responsible for preparing waste profiles to the selected disposal vendor and coordinating disposal approvals.

Based on the materials identified that will require off-site disposal, it is anticipated that the wastes generated will not be RCRA hazardous pursuant to 40 CFR 261.

The T&D Coordinator, in consultation with project management and procurement personnel, have reviewed potential vendors to prequalify transportation and disposal companies based on:

- NOV status
- Ability to handle the wastes identified
- Cost effectiveness of the available transportation and disposal options
- Past experience

At this time OHM has identified the following qualified vendors to provide transportation and disposal of non-hazardous Remedial Derived Waste for this Delivery Order:

- BFI Waste System
- Waste Management Inc.
- East Carolina Environmental

4.0 WASTE PACKAGING

All drummed waste of Personal Protective Equipment, soil cuttings, spent carbon, and decon/development water that is collected in 55-gallon (17H open-top) steel drums will be labeled and logged using OHM's standard drum inventory procedures (see Appendix A Drum Inventory Log). OHM will maintain these drum logs and a database summary of the type and quantity of wastes generated each day. Appropriate measures will be taken to keep off-site back-up copies of this data as well.

All materials will be accumulated onsite until sufficient quantities are available for shipment of a full load of drums or (20 to 30 cubic yards) of bulk material. Pending quantities of waste, OHM will bulk or package waste in bulk roll-off containers for cost effective disposal. OHM will conduct weekly inspections of the temporary waste storage areas. All temporary storage will be in compliance with 40 CFR 262.34 and the applicable North Carolina regulations.

Decon water, well development water, and SVE water will be stored in drums or storage tanks pending quantity and location of each respective site. These waters will be transported to the Base Industrial Water Treatment Plant for disposal, after analysis and MCAS Cherry Point review and approval.

5.0 PREPARATION OF REQUIRED DOCUMENTATION

OHM will prepare or oversee the preparation of all paperwork associated with off-site disposal for review and signature by LANTDIV and MCAS Cherry Point representatives. This will include TSDF waste profiles and bill of lading or non-hazardous waste manifests. The selected vendor(s) will be required to provide manifests and other shipping paperwork. A completed example of all manifests and other shipping paperwork will be provided for OHM's review and approval at least one week in advance of the scheduled start of shipments. After these documents are reviewed by OHM they will be provided to the MCAS Cherry Point EAD representative for review and signature. Final copies of all manifests and other shipping paperwork will be received by OHM's on-site personnel at least 24 hours in advance of the scheduled start of shipments.

The disposal vendors will provide written verification that the proposed disposal site is permitted to accept the contaminated materials generated from OU2, Site 10. The disposal vendors shall provide written verification that wastes were actual delivered to the disposal site.

6.0 TRANSPORTATION AND DISPOSAL

The T&D Coordinator will contact the selected vendor and schedule waste pick-ups (tankers, pump trailers and drums) in a timely manner to coordinate with the project schedule. Prior to shipment of wastes, OHM's on-site personnel, in conjunction with the T&D Coordinator, will complete the Waste Disposal Activities Checklist (see Appendix B). This checklist is to be completed for each waste shipment leaving the site. A copy of the completed form will be provided to the LANTDIV prior to waste transportation and with the Final Report.

OHM will maintain chronological organized files of weight tickets, manifest copies, LDR forms and other shipping paperwork for each shipment. OHM will also maintain a database of all pertinent information regarding each off-site shipment. Copies of the manifest files and database printouts will be provide to the LANTDIV representatives upon request and at the completion of the project in the Remedial Activities Report (RAR

APPENDIX H

VOC ANALYTICAL EXCEEDING SOIL SCREENING (B&W DATA)

TABLE 2-2

OU2 HOT SPOT NO. 1
VOC ANALYTICAL RESULTS EXCEEDING SOIL SCREENING CRITERIA FOR PROTECTION OF GROUNDWATER (μg/kg)
MCAS CHERRY POINT, NORTH CAROLINA

Sample Identification	Sample Depth	Sample Date	Parameter	Result	OU2 S3 Soil Target Concentration [1] Units
B1-14	14'	4/7/83	Chloroform	2,590	0.96
			Methylene chloride	359	21.9
B2-14	14'	4/7/83	Chloroform	470	0.96
			Methylene chloride	1,150	21.9
B3/B4-C	14'	4/7/83	Chloroform	1,400	0.96
			Methylene chloride	559	21.9
B5/B6-C	14'	4/7/83	Chloroform	1,800	0.96
			Methylene chloride	2,530	21.9
10B02-0608	6'-8'	10/25/90	1,1,1-Trichloroethane	2,500	1,484
			Trichloroethene	860	20.7
10B02-1214	12'-14'	10/25/90	Ethylbenzene	610	343
			Trichloroethene	800	20.7
10B03-0608	6'-8'	10/25/90	2-Butanone	1,900	687
10B03-0810	8'-10'	10/25/90	2-Butanone	1,200	687
10B04-1012	10'-12'	10/25/90	Trichloroethene	880	20.7
10SISB01-1012	10'-12'	11/1/93	2-Butanone	1,500	687
			Methylene chloride	1,300	21.9
10SISB03-1618[2]	10'-18'	11/1/93	2-Butanone	2,200	687
			Ethylbenzene	860	343
			Tetrachloroethene	4,800	5.9
10SISB04-1214	12'-14'	11/1/93	2-Butanone	1,600	687
			Methylene chloride	870	21.9
10SISB04-1618[2]	16'-18'	11/1/93	2-Butanone	2,200	687
			Ethylbenzene	940	343

1 S3 Soil Target Concentrations developed for OU2, as presented in OU2 RI.
2 Soil Sample collected in a potentially saturated zone. SVE is only effective in the vadose zone.

TABLE 2-3

OU2 HOT SPOT NO. 2
VOC ANALYTICAL RESULTS EXCEEDING SOIL SCREENING CRITERIA FOR PROTECTION OF GROUNDWATER (μg/kg)
MCAS CHERRY POINT, NORTH CAROLINA

Sample Identification	Sample Depth	Sample Date	Parameter	Result	OU2 S3 Soil Target Concentration[1]	NCRAF S3-61 Soil Targets Concentration[2]
10SB-E63-0204	2' to 4'	7/12/92	Benzene	130	5.6	
			1,2-Dichloroethene	4700	350/400[3]	
			Methylene chloride	86	21.9	
			Vinyl chloride	490	0.09	
10TP15-0810	8' to 10'	11/4/93	Benzene	11	5.6	
			cis-1,2-Dichloroethene	500[2]	350	
			1,2-Dichloroethane	13	1.7	
			trans-1,2-Dichloroethene	500[2]	400	
OU25B17-18	18' to 20'	1/17/97	Chlorobenzene	1500	432	438
			Etylbenzene	1400	343	241
			Xylenes (total	5800	-	4958

1 S3 Soil Target Concentrations developed for OU2, as presented in OU2 RI.
2 Sample OU2SB17 collected after S3-G1 Target Concentrations for groundwater protection published so comparison incorporated.
3 Target Concentrations for cis-1,2-dichloroethane/trans-1,2-dichloroethene.

TABLE 2-4

OU2 HOT SPOT NO. 3
VOC ANALYTICAL RESULTS EXCEEDING SOIL SCREENING CRITERIA FOR PROTECTION OF GROUNDWATER (μg/kg)
MCAS CHERRY POINT, NORTH CAROLINA

Sample Identification	Sample Depth	Sample Date	Parameter	Result	OU2 S3 Soil Target Concentration[1]
10TP18-0406	4' to 6'	11/5/93	Ethylbenzene	14,000	343
			Methylene chloride	63,000	21.9
10TP18-0910	9' to 10'	11/6/93	Methylene chloride	190,000	21.9
			Ethylbenzene	140,000	343
			Toluene	27,000	8111
OU2SB05-2224[2]	22' to 24'	7/30/94	Ethylbenzene	440	343
OU2SB07-2224[2]	22' to 24'[2]	7/30/94	Ethylbenzene	20,000	343
			Toluene	67,000	8111
OU2SB08-2224[2]	22' to 24'[2]	7/30/94	Benzene	280	5.6
			Ethylbenzene	24,000	343
			Toluene	31,000	8111

1 S-3 Soil Target Concentrations developed for OU2, as presented in OU2 RI.
2 Sample collected in potentially saturated zone. SVE is only effective in the vadose zone.

TABLE 2-5

OU2 HOT SPOT NO. 4
VOC ANALYTICAL RESULTS EXCEEDING SOIL SCREENING CRITERIA FOR PROTECTION OF GROUNDWATER (μg/kg)
MCAS CHERRY POINT, NORTH CAROLINA

Sample Identification	Sample	Sample Date	Parameter	Result	OU2 S3 Soil Target Concentration[1]
10SB-B5-0810	8' to 10'	7/12/92	Benzene	24	5.6
			1,2-Dichloroethene	1100	350/400[2]
			Methylene chloride	35	21.9
			Trichloroethene	810	20.7
10TP02-0405	4' to 5'	7/8/92	Benzene	33	5.6
			2-Butanone	16,000	687
			Ethylbenzene	360	343
			Methylene chloride	360	21.9
			Tetrachloroethene	38	5.9
			trans-1,3-Dichloropropene	98	1.2
			Trichloroethene	140	20.7
10TP14-1214		7/14/92	Ethylbenzene	1300	343

1 S3 Soil Target Concentrations developed for OU2, as presented in OU2 RI.
2 Target Concentrations for cis-1,2-dichloroethene/trans-1,2-dichloroethene.

APPENDIX A

SAMPLING AND ANALYSIS PLAN

`SAMPLING AND ANALYSIS PLAN
FOR
SOIL VAPOR EXTRACTION REMEDIATION SYSTEM
AT OPERABLE UNIT 02, SITE 10
MCAS CHERRY POINT, NORTH CAROLINA

Prepared for:

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Contract No. N62470-93-D-3032
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November 1997

Delivery Order 0080
OHM Project No. 17488

OHM Remediation
Services Corp.

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) presents, in specific terms, the policies, organization, functions, and Quality Assurance/Quality Control (QA/QC) requirements designed to achieve the data quality goals for the Soil Vapor Extraction at Operable Unit 02, Site 10. This work will be performed under Delivery Order 080 of Contract Number N62470-93-D-3032 for the Navy Atlantic Division (LANTDIV) at the Marine Corps Air Station (MCAS), Cherry Point, North Carolina.

This SAP integrates the required components of a generic quality assurance project plan (QAPP) and a field sampling plan (FSP). This document shall be implemented by the Project Manager, Project QC Manager, Project Chemist, Field Chemist/Scientist, and Sample Technicians. Any field changes shall be approved by the Navy's Technical Representative (NTR), OHM Project Manager, and OHM Project Chemist. These changes shall be documented by the Field Chemist/Scientist and distributed to the appropriate persons as amendments to the SAP.

2.0 PROJECT MANAGEMENT

2.1 PROJECT OBJECTIVE AND SCOPE OF WORK

The scope of work for Delivery Order No. 080 at Site 10 OU 2 is to install a network of soil vapor extraction (SVE) wells to be used in removing volatile hydrocarbons from the four hot spots in the areas. A total of 36 SVE wells will be used to remove the contamination (22 installed by OHM). A single blower will be used to pull vacuum on all four hot spot fields simultaneously.

The remedial action goals of the SVE system is to remove volatile organic hydrocarbons from the vadose zone in order to protect the groundwater from contaminate migration. Table 2.1 summarizes the remedial action goals from the ROD. The best available analytical methods may not achieve practical quantitation limits (PQL) below all remedial goal levels.

Table 2.1 Soil Performance Standards (1)

Contaminant	Performance Standard (2) ($\mu g/kg$)
Benzene	5.6
2-Butanone	687
Chlorobenzene	432
Chloroform	0.96
1,2-Dibromoethane	1.7
cis-1,2-Dichloroethene	350
trans-1,2-Dichloroethene	400
trans-1,3-Dichloropropene	1.2
Ethylbenzene	343
Methylene Chloride	21.9
Tetrachloroethene	5.9
Toluene	8,111
1,1,1-Trichloroethane	1,484
Trichloroethene	20.7
Vinyl Chloride	0.09
2,4-Dimethylphenol	1,194
2-Methylnaphthalene	3,235
4-Methylphenol	205
Naphthalene	925
Dieldrin	1.8
Heptachlor expoxide	6.7

(1) Table taken from ROD

(2) North Carolina S-3 Target Concentration for Protection of Groundwater

2.2 PROJECT TASK DESCRIPTIONS

The following tasks will be performed by the Field Analytical Services (FAS) group in support of the remedial actions at Site 10 OU 2 at MCAS, Cherry Point, North Carolina.

- Perimeter soil Sampling
- Screening and sampling soil of borings form well installation
- Contaminate area soil monitoring
- Area soil verification
- Moisture separator sampling
- Vapor system influent and effluent screening and sampling during operation and maintenance activities
- Sample incidental waste generated from site activities
- Evaluate analytical data generated from the off-site laboratories
- Confirmation sampling

2.3 PROJECT ORGANIZATION

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the QA Management team which will provide reviews, guidance, and technical advice on project execution issues. Members of this staff will be on an "as-needed" basis to assist in smooth project execution. The project manager will be supported by the project team consisting of a supervisory, health and safety, technical, and QA/QC staff to ensure that the project is safely executed in compliance with applicable laws, regulations, statutes, and industry codes. Individuals of the project team are responsible for fulfilling appropriate portions of the project QA program, in accordance with assignments made by the project manager. The project manager is responsible for satisfactory completion of the project QA program. Specific responsibilities may be assigned by the project manager to the deputy project manager and other members of the project staff.

An organizational chart of the project team is presented in Figure 2-1.

The responsibilities of the key members in the project organization are:

Project Manager - Steve Bivone, CHMM, REM

The project manager is responsible for the overall direction of this project executed under his supervision. He provides the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet contract requirements. He is ultimately accountable for all work activities undertaken on this project. The global quality-related responsibilities of the project manager can include, but are not limited to, the following:

- Organization of the project staff and assignment of responsibilities.
- Understanding of contract and scope of work for a specific project.
- Communication to the project staff regarding client requirements and QA practices.
- Identification, documentation, and notification to the client and project staff and QA personnel of changes in the scope of work, project documentation and activities.
- Supervision of preparation and approval of project-specific procedures, work plans, and QA project plans.
- Approval of project design bases, design parameters, drawings, and reports.
- Approval of project remedial action/construction methodologies.
- Dissemination of project-related information from the client such as design bases, input parameters, and drawings.
- Liaison for communications with the client and subcontractors. Liaison between the project staff and other internal groups.
- Decision of whether or not drawings require independent review.
- Investigation of nonconformances, notification of QA personnel, and implementation of corrective actions.
- Determination of the effect of nonconformances on the project and the appropriateness for reporting such items to the client, and providing appropriate documentation for reporting.
- Determination that changes, revisions, and rework are subject to the same QC requirements as the original work.
- Serve as final reviewer prior to release of project information.
- Approve and sign outgoing correspondence.
- Custodian of all project related documents.

Some of these responsibilities may be assigned by the project manager to the Site Supervisor, who will remain on site throughout the project field activities.

Site Supervisor - Tom Cherrix

The site supervisor is responsible for the day-to-day management of this specific delivery order. He will ensure sufficient resource allocations to maintain project schedule and budget. He will provide daily feedback to the project manager on project progress, issues requiring resolution, etc. The quality-related responsibilities of the site supervisor include, but are not limited to, the following:

- Notification to the project manager if the project cannot be completed with regard to quality, schedule, or cost.
- Oversight and control of subcontractor services.
- Liaison for communications with OHM project staff and other internal groups as well as with the NTR and on-site inspector.
- Supervision of day-to-day site activities in accordance with project and program requirements.
- Preparing the Contractor Production Report.
- Preparing the Quality Control Reports.
- Initiating corrective actions for non-conformance identified on-site.

Project Chemical QA Officer - Theresa D. Rojas

The chemical QA officer is responsible for implementing the project chemical QA program. She is responsible for informing the project manager of any site-specific QA issues. Her responsibilities include, but is not limited to, the following:

- Reviewing subcontractor's QA Manuals and/or Laboratory Quality Management Plans (LQMPs) and if possible, performing audits on the labs.
- Certifying the level of QA that has been achieved during the generation of analytical data.
- Initiating and overseeing all audit functions.
- Stopping work if quality objectives are not being met.
- Initiating investigations for nonconformances, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful.

Project Chemist - Sushama Paranjape

The project chemist is responsible for implementing the project plans and ensuring that the quality assurance and data quality objectives are being met for the project. She is also responsible for informing the chemical QA officer of any site-specific problems and for coordinating QA efforts with the contracted laboratory. Her specific responsibilities include, but are not limited to, the following:

- Determining if the project and data quality objectives are being met.
- Evaluating chemical data for technical validity and ensuring adherence to published guidelines.
- Analyzing and interpreting all subcontracted technical and laboratory results.
- Implementing QA/QC procedures.
- Assuring the continuity of chain-of-custody evidence
- Working with the QC engineer to compile and submit required QA Reports (QARs).
- Compiling, revising, updating, and submitting SAPs
- Implementing corrective actions as required by the QC engineer or chemical QC officer.

- Ongoing QA/QC training of new and current personnel.
- Reviewing laboratory invoices for completeness and accuracy.

Laboratory Coordinator - Elena Rodriguez

The laboratory coordinator is responsible for procuring a certified laboratory based on the requirements needed for the project. Her responsibilities include, but are not limited to, the following:

- Selection of qualified laboratories and control of laboratory services requests.
- Assist coordination of laboratory with field sample shipments.
- Management of laboratory data in conjunction with the project and field chemist.
- Liaison between the field and the laboratories when changes are required in the SAP and Purchase Orders.

Field Chemist -Russel Henderson

The field chemist will:

- Implement the SAP and designated QA/QC procedures.
- Oversee all field sampling activities.
- Report all QC data to the project chemist for review.
- Implement corrective actions as required by the project chemist.
- Perform on-site screening and analyses of samples, if needed.
- Fill out sample tracking forms and related analytical and QC forms and logbooks.
- Ensuring that the samples are handled, packaged, and shipped according to the SAP.
- Ensuring that the laboratory supplies the sample containers, shipping supplies, chain-of-custody records, and the required QC samples (i.e., trip blanks).

Sample Technician - Justin Barbieri

The sample technician will be responsible for:

- Carrying out all sampling in accordance with approved procedures and methodologies as defined in the SAP.
- Generating field blanks, equipment rinsate blanks, and acquiring field duplicate samples as required by the SAP.
- Completing sampling logbooks, sampling forms, labels, custody seals, and chain-of-custody forms and other paperwork as required by the SAP.
- Packaging and Shipping of samples to appropriate laboratories.

2.4 DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

Data generated from those tasks described in Section 2.2 will be used to make the site decisions. Project-specific quality objectives are listed in Appendix A, Table A-2. These include the quantitation, project action, accuracy, precision, and completeness limits by which the data will be evaluated.

A Naval Facilities Engineering Service Center (NFESC)-certified or US Army Corps of Engineers-Missouri River Division (USACE-MRD)-approved laboratory will be used for all sample analyses. The laboratory will also be North Carolina-approved. A copy of the laboratory's QA Manual, statement of qualifications, and appropriate certificates of approval are kept on file in the Norcross office and are available upon request from the NTR, LANTDIV, or other regulatory agencies. A copy of the approved Sampling and Analysis Plan will be forwarded to the laboratory selected to perform chemical analysis of the samples.

All off-site samples will meet OHM's minimum requirement for the QA/QC as specified in OHM QP-650. A copy of OP-650 is included in Appendix D. On-site air measurements will be non-definitive field screening analysis. If disposal analysis is required no duplicates or rinsate blanks will be collected. All sampling and analytical activities will be in accordance with federal, state, and local regulations. A summary of the field QC sampling requirements is shown in Table A-1, "Sampling Summary" in Appendix A.

Data evaluation will be performed by the project chemist on all data before it is used. Third party data validation will not be performed on the final data. Data evaluation results will be provided in the project closeout report.

Attn: Frank Pino
OHM Remediation (McGuire AFB)
200 Horizon Center Blvd.
Trenton NJ 08691

BARRINGER LABORATORIES, INC.
15000 West 6th Avenue, Suite 300
Golden, CO 80401
Phone: (303) 277-1687
Fax: (303) 277-1689

Client Smpl ID: 204-COMP61-654

Report Printed: 09/20/97 at 09:52:47
Status: Final
BLI Sample ID: 970155-001
Date Collected: 07/23/97 15:30
Matrix: Soil
Date Received: 07/25/97 09:55
Temperature: 4C

RGANIC	CAS No.	Procedure	W/D	Result	Unit	Report Limit	Dil. Factor	Date Prep	Date Anal	QC#	Run
AS CHROMATOGRAPHY											
DCAA	19719-28-9	SW846-8150B	Surrogate %Rec:	120	Control Limit:	43 - 167%		08/05	08/31	404	1

Preparation procedure: SW846-1311 — Initial amount of sample used: 100.0 g
Analytical procedure: SW846-8150B TCLP — Final amount of sample extract: 2,000.0 ml
Date: 08/06/1997 By: AW — Preparation factor: 20.0

Preparation procedure: SW846-8150B — Initial amount of sample used: 200.0 ml
Analytical procedure: SW846-8150B TCLP — Final amount of sample extract: 5.0 ml
Date: 08/13/1997 By: TJB — Preparation factor: 0.025

RGANIC	CAS No.	Procedure	W/D	Result	Unit	Report Limit	Dil. Factor	Date Prep	Date Anal	QC#	Run
2,4-D	94-75-7	SW846-8150B TCLP	W	<6	ug/L	6	1.0	08/06	08/27	493	1
2,4,5-TP (Silvex)	93-72-1	SW846-8150B TCLP	W	<0.85	ug/L	0.85	1.0	08/06	08/27	493	1
DCAA	19719-28-9	SW846-8150B TCLP	Surrogate %Rec:	123	Control Limit:	18 - 141%		08/06	08/27	493	1

3.0 SAMPLING

3.1 SAMPLING METHODS AND PROCEDURES

The following sections describe sampling locations, frequencies, sample matrices, and measurements of parameters of interest. Table A-1 "Sampling Summary" in Appendix A presents a summary of these items.

3.1.1 Perimeter Boring Samples

Twenty four soil borings will be performed at the sites (6 at each hot spot). A sample will be collected every 5 to 10 feet with a split spoon sampler. Samples will be screened with FID and the sample that has the highest reading from each bore hole will be sent to the off-site laboratory for volatile analysis. The procedure for screening and collecting samples along with the EnCore Soil Sampler procedure are outlined below. The EnCore Soil Sampler is a patented disposable volumetric sampling device developed for sampling volatile compounds with little volatile loss on storage and shipment. QP-617 Standard Operating Procedure (SOP) for the Split Spoon Sampler is included in Appendix D for reference.

Sampling equipment will be thoroughly cleaned between borings using decontamination procedures described in Section 3.5. Field sampling personnel will wear disposable sampling gloves during sampling and will change gloves between locations to minimize the potential for cross-contamination. Other PPE may be required per the site HASP.

Screening and Sampling Procedure for Split Spoons

1. ASAP after the split spoon sampler is opened, an EnCore sampler is used to collect a 5 gram soil sample in the middle of the split spoon soil core. This sample is labeled and put into the cooler.
2. A 4 oz jar is filled next with no head space, labeled, and put into the cooler. A clean stainless steel (SS) or plastic spoon/spatula can be used to fill the jar.
3. An eight oz jar is ½ filled last. This container is not placed into the cooler, but is used to determine which boring interval will be use for off-site analysis.
4. A piece of aluminum foil is placed over the jar before the cap and then the jar is allowed to sit for 5 minutes.
5. Using a PID or FID monitor, poke a hole through the aluminum foil and read the highest reading.
6. The sample from each boring with the highest reading will be sent off-site for volatile analysis. Other samples collected can be disposed.

Procedure for EnCore Soil Sampler

1. Open the EnCore reusable package and remove the core device and cap.

2. Place into the T-handle with the plunger pulled back.
3. Push into the soil to be sampled, packing the soil into the sampler.
4. Remove from the soil, brush of the sides, and put the cap seal onto the sampler.
5. Label and reseal in the original package.
6. Place into the cooler for shipment.

3.1.2 SVE Well Samples

As the 22 SVE wells are installed, a sample of soil from each well will be collected. A sample will be collected every 5 to 10 feet with a split spoon sampler. Samples will be screened and the sample that has the highest reading will be sent to the off-site laboratory for volatile analysis. The procedure for screening and collecting samples is outlined in Section 3.1.1.

3.1.3 Contamination Monitoring Samples

After three months, one sample will be collected from 4 borings in each hot spot 1,2 and 4. A sample will be collected every 5 to 10 feet with a split spoon sampler. Samples will be screened and the sample that has the highest reading will be sent to the off-site laboratory for volatile analysis. The procedure for screening and collecting samples is outlined in Section 3.1.1.

3.1.4 Contamination Verification Samples

After twelve months, one sample will be collected from 4 borings in each hot spot 1,2,3 and 4. A sample will be collected every 5 to 10 feet with a split spoon sampler. Samples will be screened and the sample that has the highest reading will be sent to the off-site laboratory for volatile analysis. The procedure for screening and collecting samples is outlined in Section 3.1.1.

3.1.5 Moisture Separator Samples

Once during startup and once after the system has been operated for an undefined period, a sample will be collected from the influent and effluent of the moisture separator. It is anticipated that a direct sampling port will be available for taking a direct fill sample. If a port is not available, a disposable bailer will be used to collect the samples. QP-618 SOP for bailer is included in Appendix D for reference.

Two 40 ml VOA vials with Teflon septa sampling containers will be required at each sample location. The samples will be preserved with HCL to a pH of <2. Sample vials will be filled and capped with out any air bubbles collected. After filling the sample containers invert and tap lightly and look for the present of air bubbles. If bubbles are present, refill or recollect the sample.

3.1.6 Air Sampling for the System Influent and Effluent

Influent to the Granular Activated Carbon (GAC) will be sampled during startup, weekly for eight weeks and then monthly for 22 months with SUMMA canisters for TO-15 analysis. Each time a SUMMA sample is collected, a sample will be collected for FID field analysis and vinyl chloride analysis with Drager tubes. These samples, where possible, will be direct samples from the system. Where direct sampling is not possible, integrated grab samples will be collected with a vacuum box sampler. In addition, FID measurements will be made at each well head, the system influent and the system effluent weekly to monitor the system. If the GAC units have been removed the system influent samples can be omitted. They will be the same as system effluent. Drager tube measurements will be made weekly also to monitor the system for select compounds.

The system effluent will be sampled during startup, daily for 7 days, and weekly for two weeks with SUMMA canisters for TO-15 analysis. Each time a SUMMA sample is collected, a sample will be collected for FID field analysis for total hydrocarbons and vinyl chloride analysis with Drager tubes. These samples, where possible, will be direct samples from the system. Where direct sampling is not possible, integrated grab samples will be collected with a vacuum box sampler. These sampling results will be used to correlate Drager and FID results to the TO-15 analysis.

Procedures for collecting SUMMA samples, integrated bag samples, analysis of the bag samples and operation of Drager tubes are outlined below.

Procedure for SUMMA Canister Sampling

1. Connect a piece of ¼ inch Teflon tubing to the sample port
2. Allow the probe and tubing to purge for one minute. Then connect the other end of the Teflon tubing to the SUMMA canister
3. Open the valve on the canister and allow the sample to flow into the canister.
4. Close the bag's valve when the canister's gauge goes to 0.
5. Turn off the valve at the sample port and release the tube from the canister.
6. Label and package the canister for shipment to the laboratory.

Note:

a. If the sample port does not have the pressure to fill the canister, collect the sample from the port using a tedlar bag and a vacuum box as described in the manufacturer's manual. Then transfer the contents of the tedlar bag into the canister.

Procedure for Tedlar Bag Sampling

1. Connect a piece of ¼ inch Teflon tubing to the sample port
2. Allow the probe and tubing to purge for one minute. Then connect the other end of the Teflon tubing to the Tedlar bag
3. Open the valve on the bag and allow the sample to flow into the bag. See note (a).
4. Close the bag's valve when it is ¾ full.
5. Analyze the bag with the FID organic monitor. (Procedure outlined below).

Note:

a. If the sample port does not have the pressure to inflate the bag, a vacuum box will be required. If this is the case, follow the manufacturer's instructions. A Supelco 2 Liter Air Sampler Operations Manual is enclosed in Appendix C.

Procedure for Analysis of Bag Samples

1. Calibrate the FID per manufacturer's instructions.
2. Connect the Tedlar bag to the FID probe using ¼ inch Teflon tubing. Record the concentration reading.
3. If the sample is over the range of the FID (usually 10,000 ppm), connect the dilution probe to the FID tip as per the manufacturer's recommendations and analyze the sample. Record the results and final dilution factor. See note (a).
4. Evacuate the sample bag and purge three times with clean air or nitrogen.
5. Test the bag for cross-contamination with the FID before reuse.

Note:

a. The dilution probe kit has several dilution orifices. Choose the dilution ratio that best meets the sample levels.

Procedure for Drager Tube Sampling and Analysis

1. Test the Drager tube bellows pump by inserting an unopened tube and squeeze the pump. After releasing, the position of the pump body should not change within one minute. To test the suction, squeeze completely and release. The pump should open instantly. If the pump fails any of these tests, replace.

2. Break the ends off of the tube.
3. Place the tube into the bellows pump fitting with the arrow pointing into the pump (with the air flow).
4. Squeeze the bellows and let it recharge.
5. Repeat per tube instructions and remove the tube.
6. Read concentration from the tube and record along with the number of pumps.

3.1.8 Contractor Generated Waste Samples

Samples may be required from the decontamination fluid, PPE, or water wastes for disposal analysis. If samples are required, Table A-1 in Appendix A lists the required analysis for disposal of these materials. Before sampling these materials verify the required analysis with John Rhyne Regional T&D Coordinator. Depending on the disposal facility, additional analysis may be required.

Aqueous wastes will be collected by direct fill or with a sludge judge from the holding containers. PPE wastes will be collected using scissors or knives.

3.2 SAMPLE IDENTIFICATION

The samples collected on-site will be provided with a unique sample designation. The number will serve to identify the site, location, and specific sample identification number. The sample designation format will be as follows:

CPXX-NNN-DD
where:
CP = Cherry Point
XX= Delivery Order for the project (80)
NNN = Sequential number starting at 001
DD = QC identifier
If sample is a field QC sample, the following designations will be added as a suffix

FB - Field Blank
RB- Equipment Rinsate Blank
(Duplicates must not to be identified to the laboratory

Sample location information will be included in the sample description area of the COC. Sample sequential numbers are not to be duplicated. Duplicate samples will be sent to the off-site laboratory blind. The latest OHM COC has been designed so that the cross-reference of the duplicate to the original sample can be included on the last page of the COC that does not go to the laboratory.

3.3 SAMPLE PRESERVATION AND HOLDING TIMES

Samples collected for off-site analyses will be sent to the laboratory within 24 hours after collection to ensure that the most reliable and accurate answers will be obtained as a result of the analysis. The holding time begins from the date and time of collection in the field.

All environmental and treatment system samples, except for aqueous samples for metals, will be preserved to a temperature of 4°C prior to shipment to the analytical laboratory, using ice or refrigeration. This temperature should be maintained during shipment by placing ice in leak-proof containers, and placing it above and below the sample containers. Other sample preservation requirements and holding times applicable to the sample matrix and analyses are listed in Appendix A, Table A-1.

3.4 FIELD QC SAMPLES

The appropriate number of field QC samples, as specified in the NFESC, 1996 document will be collected during this project. These samples will include field blanks, equipment rinsate blanks and field duplicate samples. These samples will be collected at the following frequencies and analyzed for the parameters listed in Appendix A, Table A-1:

- Field Blanks (Ambient Blanks) – Field blanks , sometimes referred to as ambient blanks, are samples of contaminant-free media (reagent grade water) witch are prepared at the site and handled in the field in the same manner as all other field samples. Field blanks are collected during the course of field sampling and, to the extent possible, in the actual sampling locations. Field blanks are collected by placing contaminant-free medium (reagent grade water) in the same type of container as field sample. Field blanks are preserved and stored in the same manner as field samples. At a minimum, one field blank per contiguous site from each sampling event is collected and is analyzed for those interfering contaminants that could potentially be present in ambient air at the sampling site. Approximate number of field blank samples planned to be collected is presented in Appendix A, Table A-1.

- Equipment Rinsate Blank – Equipment rinsate blanks are the final analyte-free water rinse from equipment cleaning collected daily for each matrix sampled. An equipment rinsate blank is collected in the same type of sample containers, and in all other ways is handled in the same manner as other field samples. The equipment rinsate blank must be collected during the sampling event (after collection of at least one field sample) after the sampling equipment has been decontaminated and prior to collection of the next field sample.

- All equipment that comes into contact with field samples must be decontaminated prior to use. The use of disposable equipment is acceptable, but does not obviate the requirement for decontamination prior to use, or the requirement for collection of equipment rinsate blanks. Equipment rinsate blanks for disposable equipment are collected by passing contaminant-free medium through or over the decontaminated equipment. One equipment rinsate blank is collected per day, per sampling event for each matrix sampled that day. Equipment rinsates are analyzed for the same parameters as the sample collected that day. Approximate number of equipment blank samples planned to be collected is presented in Table A-1, Appendix A.

- Field Duplicate – Duplicates for soil samples are collected, homogenized, and split. All samples except volatiles are homogenized and split. Volatiles are not mixed, but select segments of soil are taken from the length of the core and placed in 4 oz glass jars. The duplicates for water samples are collected simultaneously. Field duplicates must be collected at a frequency of one sample per day per matrix or 10% of the field samples per matrix. All the duplicates should be sent to the primary laboratory responsible for analysis, along with the samples. Approximate number of field duplicates planned to be collected are presented in Table A-1, Appendix A. Duplicates will be sent to the off-site laboratory blind.

- Trip Blank -- Trip blanks are defined as samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile samples. One trip blank should accompany each cooler containing aqueous and non-aqueous volatile samples, should be stored at the laboratory with the samples, and analyzed by the laboratory. Trip blanks are only analyzed for volatile organic compounds and may not be required for this project if disposal samples are not taken. Approximate number of trip blank samples planned to be analyzed is presented in Table A-1, Appendix A.

3.5 DECONTAMINATION

All sampling equipment (hand augers, spoons, stainless steel/glass mixing bowls, etc.) will be decontaminated before sampling commences, between each sample location, and prior to leaving the site. The procedures for decontamination of equipment according to NEESA 20.2-047B are as follows.

1) Remove gross contamination by scraping or brushing.
2) Clean with tap water and phosphate-free laboratory detergent (liquinox), using a stiff brush to remove all surface contaminants.
3) Rinse thoroughly with tap water.
4) Rinse with 1:1 nitric acid (HNO3) metals grade (metal samples only).
5) Rinse thoroughly with tap water.
6) Rinse thoroughly with deionized/distilled water.
7) Rinse twice with reagent grade isopropanol or methanol.
8) Rinse thoroughly with organic-free water and allow to air dry. (Do not rinse with deionized/distilled water. If organic-free water is not available, allow equipment to air dry.)
9) Wrap equipment with aluminum foil prior to storage or transportation to sample locations.

Decontamination fluids will be collected in properly labeled 55-gallon drums, and staged in a secure area until final disposal unless other arrangements are made.

3.6 CROSS-CONTAMINATION MINIMIZATION

Cross-contamination is the introduction of contaminants into the sample through the sampling and/or sample-handling procedures. It can cause an otherwise representative sample to become non-representative. The most important means of minimizing cross-contamination are as follows:

- Sampling expendables, i.e., sample gloves, pipettes, string, dip jars, etc., must not be reused. Used expendables should be labeled so they are not confused with non-contaminated trash
- Minimum contact should be made between the sampler and the sample medium. For example, a sampler should not touch the sample during while loading the sample in the container.
- Sample collection activities should proceed progressively from the least contaminated area to the most contaminated area.
- Sampling equipment should be constructed of Teflon, stainless steel, or glass that has been properly precleaned for collecting samples. Equipment constructed of plastic or PVC should not be used to collect samples for trace organic analyses.

- Any tools used in sampling must be carefully decontaminated prior to first use and after each use.
- Activities that could contaminate samples are prohibited in the sample handling and preparation area. These activities and the possible contaminants include:

Activity	*Possible Contaminants*
Smoking	Poly Aromatic Hydrocarbons
Spraying for insects	Pesticides, oils, solvents
Spraying for weeds	Herbicides, oils, solvents
Refueling	BTEX, hydrocarbons
Painting and paint stripping	Solvents

3.7 SAMPLE LOG BOOK

It is necessary for the sampling crew to maintain daily field notes. Items that must be included are sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, personnel protection, and activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

- Repetition of information recorded in other permanent logs should be avoided, but enough should be recorded to present a clear and accurate picture of technical activities. At a later date, should a question arise concerning a specific event or a procedure used, it will be answered from these notes. The following information should be logged into the logbooks and/or database:
- Date and time of sampling
- Sample number, locations, type, matrices, volumes, sample ID and descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, Chain-Of-Custody (COC) and air bill numbers, preservatives, and date samples were sent
- Name of laboratories and contacts to which the samples were sent, turn around time (TAT) requested, and data results, when possible
- Termination of a sample point or parameter and reasons
- Unusual appearance or odor of a sample
- Measurements, volume of flow, temperature, and weather conditions
- Additional samples and reasons for collecting them
- Levels of protection used (with justification)

- Meetings and telephone conversations held with LANTDIV, NTR, regulatory agencies, project manager, or supervisor
- Details concerning any samples split with another agency
- Details of QC samples collected

These notes must be dated and signed (each page) for validity. All logbooks will be bound and pre-numbered. All log book entries will be made with indelible ink and legibly written. The language will be factual and objective. No erasures will be permitted. If an incorrect entry is made, the error will be crossed out with a single strike mark, initialed, and dated. When audits are performed, the auditor's remarks and decisions must also appear in these notes. These audits should be followed up by written report submitted by the auditor, including opinions and conclusions. A copy of this report should be placed in the project file and one copy kept in the sampling file for easy reference. This information will also be entered in to the data base program that been prepared for the site. It will be entered daily by the field chemist or sample technician. This person will be the point of contact for all sampling and analytical information. Report outputs from the database is an acceptable substitute for the sample logbook.

3.8 SAMPLE LABELS

Any samples placed into a sample container will be identified by a sample label. Sample label will identify the following information:

(1) PROJECT NUMBER
(2) DATE- Month, day, year
(3) TIME- Military time
(4) SAMPLE NUMBER- See Section 3.2 for designations
(5) SAMPLE DESCRIPTION
(6) SAMPLER- Sampler's name
(7) PRESERVATIVES
(8) ANALYSIS REQUIRED- See Appendix A, Table A-1

The information described above should be printed neatly using an indelible marker. After the sample is taken and the label is securely attached, the sample is logged into the sample log book. An example of a sample label is presented in Appendix B.

3.9 CUSTODY SEALS

Custody seals are narrow strips of adhesive tape of glass fiber used to demonstrate that no tampering has occurred. They may be used on sampling equipment, sample transport containers, and individual sample containers. They should be signed and dated by the sampler and placed from one side, across the top, and to the other side of the sample container or across the openings of the sample transport containers. An example custody seal is presented in Appendix B.

3.10 CHAIN-OF-CUSTODY PROCEDURES

In order to generate legally defensible data of the samples collected throughout the project, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. To maintain and document sample possession, chain-of-custody procedures are followed as described below:

A sample is under your custody if:

(1) It is in your actual possession, or
(2) It is in your view, after being in your physical possession, or
(3) It was in your physical possession and then you locked it up to prevent tampering, or
(4) It is in a designated secure area

An example of a COC form is presented in Appendix B. The following information is required on the COC:

(1) Project Name
(2) Project Location- City and State in which the project site is located
(3) Project Number
(4) Project Contact-OHM employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results are given (Project Manager, Site supervisor, or Project Chemist)
(5) Site Telephone Number- The telephone number of on-site office trailer or number where person responsible for samples can be contacted.
(6) Sample Date-Month, Day, Year
(7) Sample Time- Military time
(8) Sample Identification- Sample number and location

3.9 CUSTODY SEALS

Custody seals are narrow strips of adhesive tape of glass fiber used to demonstrate that no tampering has occurred. They may be used on sampling equipment, sample transport containers, and individual sample containers. They should be signed and dated by the sampler and placed from one side, across the top, and to the other side of the sample container or across the openings of the sample transport containers. An example custody seal is presented in Appendix B.

3.10 CHAIN-OF-CUSTODY PROCEDURES

In order to generate legally defensible data of the samples collected throughout the project, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. To maintain and document sample possession, chain-of-custody procedures are followed as described below:

A sample is under your custody if:

(1) It is in your actual possession, or
(2) It is in your view, after being in your physical possession, or
(3) It was in your physical possession and then you locked it up to prevent tampering, or
(4) It is in a designated secure area

An example of a COC form is presented in Appendix B. The following information is required on the COC:

(1) Project Name
(2) Project Location- City and State in which the project site is located
(3) Project Number
(4) Project Contact-OHM employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results are given (Project Manager, Site supervisor, or Project Chemist)
(5) Site Telephone Number- The telephone number of on-site office trailer or number where person responsible for samples can be contacted.
(6) Sample Date-Month, Day, Year
(7) Sample Time- Military time
(8) Sample Identification- Sample number and location

(9) Sample Type-Designation of sample as grab or composite
(10) Sample Description- Sample matrix, and a brief description of the sampling location
(11) Sample Preservation- Preservatives used
(12) Analytical Parameters Requested -- Analytical parameter, method numbers, and specific compounds of interest, if applicable.
(13) Air bill Number
(14) Laboratory -- Laboratory where samples are to be sent
(15) Laboratory Phone -- Telephone number of laboratory
(16) Laboratory Contact -- Contact person for laboratory
(17) Relinquished By -- Signature of sender (OHM)
(18) Date Relinquished -- Date samples were relinquished
(19) Accepted By -- Signature of acceptor
(20) Date Received -- Date samples were accepted
(21) Turnaround Time -- Turnaround times requested or date the results are required from the lab
(22) Sampler's Signature -- Signature of sampler

The COC will be sealed in a ziploc bag and taped in place on the underside of the top of the sample transport container (cooler).

3.11 PACKAGING, HANDLING, AND SHIPMENT OF SAMPLES

Samples will be packaged as to minimize shifting of the samples during shipment. An absorbent, such as vermiculite or kitty litter, will be placed at the bottom of the shipment container in order to absorb any liquids in the event of sample breakage. All samples will be individually placed into appropriately sized ziploc bags and sealed.

Samples, which must be kept at 4°C, will be shipped on ice in insulated containers. Ice will be placed in a container such as a ziploc bag and sealed so that water will not fill the shipping container as the ice melts. The ice will be double bagged to insure the ice does not leak. Aqueous samples for metals analysis, except hexavalent chromium, shall not be shipped or stored under refrigeration.

Samples will be shipped via an overnight shipping agency to the appropriate laboratory. IATA regulations will be followed as they are more applicable to OHM's method of sample shipment. Instructions for filling out shipment documentation are included in Appendix B. These instructions are for shipping samples with unknown or limited hazards. All information will be entered as directed. No changes or substitutions to these instruction will be made irrespective of their significance. A copy of the OHM sample shipping label is included in Appendix B.

4.0 DATA ACQUISITION

4.1 ANALYTICAL METHOD REQUIREMENTS

Analytical requirements for this project are listed in Appendix A, Table A-1. All samples will be analyzed according to USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods whenever possible. Alternative methods of analysis from other sources (ASTM, NIOSH, Standard Methods, etc.) may also be used.

Soil samples and air samples will be screened using a FID organic hydrocarbon analyzer. Air samples will be screened with the FID and Drager tubes. The procedures for these non-standard analysis have been included in Section 3 discussions.

4.2 QUALITY CONTROL REQUIREMENTS

Project Quality Control (QC) requirements for precision, accuracy, completeness, and quantitation limits are listed in Appendix A, Table A-2. Some of the Remedial Goal Concentrations are below method quantitation limits (GL). For these compounds, the laboratory's QL will be used. QC procedures and acceptance limits must be met as specified in the individual methods. In addition, the laboratory must meet the specification and requirements as described in the NFESC, 1996 document.

4.3 INSTRUMENT TESTING, INSPECTION, AND MAINTENANCE

Proper maintenance is critical to the performance of minimization of downtime of all equipment, whether it be for measurement or support. Inspection will be performed , at a minimum, prior to use of the instruments. Preventive maintenance will be performed as recommended by the manufacturer of the respective equipment. All routine maintenance and major repairs performed on field screening or analytical equipment will be recorded in bound maintenance logbooks that have been specifically designated for that instrument. Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent use, or will be tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated or completely replaced.

4.4 INSTRUMENT CALIBRATION

All calibrations on field instruments will be performed , as a minimum, on a daily basis. Every calibration will be recorded in the maintenance logbook for each instrument. Quality control check standards from a separate source will be used to check initial calibration, and acceptance and rejection criteria.

Monitoring instruments, such as the OVA or FID, O2/LEL meter, Monitox, etc. will be calibrated as specified in the HASP. Off-site analytical instruments will be calibrated according to the method specifications and the laboratory's QA Manual.

5.0 DATA MANAGEMENT

Data management is the system by which data is reduced, reviewed, validated, reported, distributed, and finally archived. The criteria in this system are designed to meet the project objectives.

5.1 LABORATORY DATA REDUCTION

Data reduction includes the identifications and calculations necessary to convert the raw instrument readings to the final reported compounds and their respective concentrations.

Responsibilities of Analyst

Each analyst is responsible for converting raw data into reportable values. These specific duties include:

- Proper identification of the analyte
- Generation of calculations
- Checking associated calibrations to ensure support of data
- Associated QA/QC checks are supportive of data
- Associated documentation is complete and accurate in respective log books
- Associated chromatograms and strip chart recordings are labeled with data, instrument number, run parameters and analyst

5.2 LABORATORY DATA VALIDATION

All data generated for the project within the laboratory will be extensively checked for accuracy and completeness. The data validation process consists of data generation, reduction, and three levels of review.

The analyst who generates the raw data has the prime responsibility for the correctness and completeness of the data. All data generated and reduced will follow protocols specified in the laboratory SOP. Each analyst reviews the quality of his work based on an established set of guidelines. The guidelines are:

- Sample preparation information is correct and complete
- Analysis information is correct and complete
- The appropriate Standard Operating Procedures have been followed
- Analytical results are correct and complete
- Analysis is performed within prescribed holding times.
- QC samples are within established control limits

- Blanks are within appropriate QC limits
- Special sample preparation and analytical requirements have been met
- Documentation is complete

The next level of review is performed by the section supervisor or data review specialist. The review is structured to ensure that:

- Calibration data are scientifically sound, appropriate to method, and completely documented.
- QC results are within established limits.
- Reporting units are consistent with the method and the matrix.
- Quantitative results are correct.
- Data results are consistent with information on the COC.
- Documentation is complete.
- The data is ready for incorporation into a final report.
- The data package is complete and ready for data archive.

The second level of review is structured to ensure all calibration data and QC sample results are reviewed and all of the analytical results from 10 percent of the samples are checked back to the bench sheet. If no problems are found with the data package, the review is complete. If problems exist, an additional 10 percent is reviewed, the process continues until no errors are found or the package has been reviewed in its entirety.

The final level of review by the laboratory comes from the program administrator or laboratory QA Officer. He/she reviews the report to ensure that the data meets the overall objectives of the project.

Once the data has been validated, it is ready for report production. The report will contain:

- Description of sample types
- Tests performed, problems encountered during testing
- Dates sampled
- Date received
- Date extracted
- Date analyzed
- Analytical results
- Reportable limits
- QC information: percent recovery, relative percent difference, control limits, blanks analyses, matrix spikes, and other additional special QC information

- Qualifiers for data falling outside of QC limits
- Methodology
- Name of the analyst
- Signature of laboratory representative
- Dual column confirmation results
- Calibrations (when requested)
- Instrument performance checks (when requested)
- QC Batch number

The report from the laboratory will be paginated and will also include a copy of the original COC for the samples analyzed.

5.3 PROJECT DATA REVIEW

Project Chemist Data Review Responsibilities

The project chemist is responsible for initial review of the data from the laboratory. This review includes:

- Verifying that all requested data are reported
- Verifying that samples are analyzed according to the contract specified method
- Verifying that all analytes requested are reported
- Verifying that holding times are not exceeded
- Verifying that matrix spike, matrix spike duplicate, and surrogate recoveries fall within the laboratory's acceptable criteria
- Reviewing blank data for contamination
- Reviewing field quality control results for inconsistencies
- Verifying that the data generated meet the project Data Quality Objectives.

The project chemist is responsible for informing the Project Manager and Project Chemical QA/QC Officer of any laboratory and/or sampling deficiencies or issues. These issues and subsequent decisions will be documented on the data evaluation report produced by the Project Chemist for each data package.

Project QC Engineer Data Review Responsibilities

The Project QC Engineer is responsible for interfacing with the project chemist, project manager, and the laboratory's QA Officer to resolve any QA/QC issues affecting the data. He/she is also responsible for finalizing any QA/QC issues with the laboratory and/or the project chemist. This includes obtaining a corrective action from the parties involved.

5.4 DATA REPORTING

The preliminary data will be faxed to the project chemist. This data may or may not have undergone the full laboratory review process and may contain errors and discrepancies. Prior to the use of data results for any decisions, the data will be reviewed by the project chemist and assessed against the project goals and data quality objectives. A copy of the preliminary data, including review comments from the project chemist will be submitted to the site and/or the project manager.

The hard and final copy data will be evaluated by the project chemist and assessed against the project goals and data quality objectives. Any errors, discrepancies, and nonconformances will be brought to the laboratory's and project manager's attention.

When QA issues have been satisfactorily settled and data evaluation has been completed, the project manager may release the data to the client and/or regulating agencies.

5.5 DATA STORAGE AND ARCHIVE

After OHM has completed its work for the project, all documents generated will be assembled in the project file. Individuals may retain clean (no handwritten comments) copies of documents for their personal files but only after personally verifying that the original or similar copy is in the project file. The project manager/supervisor is responsible for ensuring the collection, assembly, and inventory of all documents relative to the project at the time the objectives are met. The file then becomes accountable. Any records leaving the file must be signed out.

When a contractor has completed the project objectives, all file documents are reviewed and submitted to the central file. The project file contains the following document classes:

A. Project logbooks
B. Drum logs and other forms
C. Sample identification documents
D. Chain-of-custody records
E. Analytical logbooks, laboratory data, calculations, graphs, etc.
F. Correspondence
   - Inter-office
   - Client
   - Regulating agencies
   - Record of confidential material

G. Report notes, calculations, drafts
H. References, literature
I. Sample (on-hand) inventory
J. Check-out logs
K. Litigation documents
L. Miscellaneous – photographs, maps, drawings, etc.

Once deposited in the file, documents must be checked out. The final report is usually generated by use of computer. A back-up copy of the report on diskette is filed along with the project file. The original report remains in the hard drive of the computer until such a time is required to download it on a diskette. This diskette is also archived. All information under the corresponding project number is maintained in the archive system for five years. All archives are accessed by the archives file master list which is maintained in a separate location from the archives.

6.0 DATA ASSESSMENT PROCEDURES

Reliability in analytical determination is maintained through strict adherence to quality control procedures. Procedures are designed to control both the accuracy and precision of analytical results. For the validation of the data, a known method spike is routinely analyzed to ensure the accuracy of results. The procedure is to run the standard QA/QC and sample analysis with each lot of samples sent to the laboratory. If more than ten individual analyses are made, additional standards will be analyzed at a rate of one standard per ten analyses. Some procedures call for the use of either a surrogate spike or the standard addition of a known quantity of the analyte to a split of the sample being analyzed.

Control charts will be prepared using an estimate of the spike recovery obtained from the literature or determined by repeated analyses run in the laboratory. Each time the analyst runs a method spike, the results is entered on the control table. If a standard addition technique is used, a plot of instrument response versus added analyte concentration is made in order to determine analyte concentration in the original sample. These are further explained in the laboratory's QAM.

Replicate analyses will be performed on at least 10 percent of the samples processed by the laboratory. A record of the precision of most analyses is kept by calculating and plotting the industrial statistic I (which is equivalent to the coefficient of variation). Blanks are also run with each batch of samples or individual sample analyzed regardless of the level of certification of the data.

The purpose of spikes, blanks, and replicates is to provide a sound scientific basis from which the degree of certification of the resultant data can be objectively concluded. These are not management decisions, but follow naturally from the results of the above QC procedures.

6.1 ACCURACY

Data accuracy is a reflection of the efficiency of the analytical procedure. It is determined by use of spiked samples and standard reference materials or laboratory control samples performed at the rate of one set every 20 samples. A control chart is generated using historical laboratory data where warning and control limits are established to assess data accuracy.

The accuracy (check standards) samples will have concentration values of the mid-standard. During analysis, a minimum of 10 percent of samples are accuracy samples. The accuracy samples are staggered through the analysis, not placed one after another. After a minimum of seven accuracy samples are analyzed, the percent recovery is calculated for each sample.

The accuracy criteria is determined by calculating the standard deviation of seven or more percent recovery values and setting the upper and lower control limits using the following equations:

Upper control limit = p + 3 SD
Lower control limit = p - 3SD

Where:
p = Average percent recovery
SD = Standard deviation

After the standard deviation, for the seven or more samples has been calculated, the accuracy control limits are generated and are then used to determine if the analysis is out of control. This is done by checking the results against the control limits. If any values are above the upper control limit or below the lower control limit, all sample results after the last qualifying accuracy sample must be repeated or discarded. If seven consecutive values fall below the lower control limit, new limits are calculated using the new accuracy check values. If the values fall between the upper and lower limits, then conditions are reported as "within limits."

6.1.1 Recovery Control

Recovery control is necessary to determine if the sample matrix is interfering with the constituent being analyzed. A minimum 5 percent of samples will be recovery check samples (matrix spikes). Samples involving different types of matrices will have at least one recovery check sample for each matrix.

Control limits will be determined for each matrix, determining the deviation for seven or more percent recovery values.

6.2 PRECISION

Duplicate and replicate samples analyzed by the laboratory assess the precision of the sampling effort. Control limits for duplicate/replicate RPDs are listed in Appendix A, Table A-2. Once a sufficient amount of replicate data becomes available, field precision control charts are constructed similar to the laboratory precision charts. For any given concentration, the mean and the standard deviation(s) of the replicates are calculated. Data from each sample set are pooled with the previous sample sets to generate control and warning limits for the next set. Control and warning limits for water samples are set at ± 2s and ± 3s, respectively. Control limits for solid samples are more liberally established due to matrix heterogeneity. Data outside any control limit are subject to QA review.

Precision is based upon the results of the relative percent differences as calculated from the percent recoveries of the matrix spike and duplicate samples. The control limits for precision is based on historical laboratory data.

MS and MSD samples on a per batch or a minimum frequency of 5 percent are analyzed to assess precision. Duplicate results are compared and the relative percent difference (RPD) is then determined. The RPD will be entered into the laboratory's data system and will be used to define the precision of the analysis. Minimum limits are listed in Appendix A, Table A-2.

6.3 COMPLETENESS

The field supervisor must ensure all sites are sampled for all the specified analyses, that sufficient sample volume has been provided to complete those analyses, and that all of the QA samples have been included with each sample set. The goal for completeness for each sample set shipped to the laboratory is 100 percent. Minimum limits are listed in Appendix A, Table A-2.

Completeness is expressed as the percentage of the amount of valid data obtained to the amount of data expected. For a set of data to be considered complete, it must include all QC data verifying its accuracy and precision.

If samples analyzed do not meet all QC requirements in terms of accuracy and precision for any specific parameter, the sample preparation and analysis will be repeated pending adequate volume.

6.4 CRITERIA FOR REJECTION OF OUTLYING MEASUREMENTS

There are many statistical tests for rejection of outlying data points obtained from a set of measurements from a single population. A test recommended in "Statistical Manual of the Associate of Official Analytical Chemists," 2nd Edition, W. J. Youden and E. H. Steiner, 1975, pg. 86, is the Dixon Test. This test is not dependent on the distribution of the data and can be used for as few as three measurements. A more complete description for this broadly applicable test can be found in the referenced text.

Another reference is the USEPA National Functional Guidelines for Data Validation of Organics and Inorganics. Also, specific programs may have quality objectives with criteria for rejection of outlying measurements.

6.5 METHOD DETECTION LIMITS AND PRACTICAL QUANTITATION LIMITS

Method detection limits (MDLs) must be established by the laboratory. This should, at a minimum, be established on a yearly basis. MDL is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.

Practical quantitation limit (PQL) is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. The PQLs are generally 5-10 times the MDL. The PQL is the most applicable limit of reporting for this program.

6.6 LABORATORY AND FIELD CONTAMINATION

It is not unusual to find the following analytes at trace levels in the samples:

- Methylene chloride
- Acetone
- Freon (1,1,2-trichlorotrifluorethane)
- Bis(2-ethylhexyl)phthalate
- Hexane
- Isopropanol
- 2-Butanone

These are common solvents used in the field and in the laboratory.

In order to fully evaluate data containing trace levels of these contaminants, one must have data from trip blanks, field blanks, equipment blanks, and all applicable laboratory blanks for that batch of samples.

The determination on the use of the data will be made during the Data Validation process.

7.0 PERFORMANCE AND SYSTEM AUDITS

Audit is defined as systematic check to determine the quality of operation of field and laboratory activities. It is comprised of the following:

- Performance audit
- System audits

These include a detailed review of each operating component of the network. Auditing will ultimately assist in determining if each element within a system is functioning appropriately per the QA program requirements.

7.1 FIELD PERFORMANCE AUDITS

Field performance audits are performed on an ongoing basis during the project as field data is generated, reduced, and analyzed. All numerical analyses, including manual calculations are documented. All records of numerical analysis are legible, of reproduction quality, and supporting to complete permit logical reconstruction by a qualified individual other than the originator.

Other indicators of the level of field performance are the analytical results of the blank, duplicate, and replicate samples. Each blank analysis is an indirect audit of effectiveness of measures taken in the field to ensure sample integrity. The results of the field duplicate and replicate analysis is an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

7.2 FIELD SYSTEM AUDITS

System audits of site activities are accomplished by an inspection of all field activities by the Project Chemical QC Officer. This audit is composed of comparisons between current field practices and standard procedures. The following is a list of criteria to be used in the evaluation of field activities:

- Overall level of organization and professionalism
- All activities conducted in accordance with work plan
- All procedures and analyses conducted according to procedures outlined in this document
- Sample collection techniques versus the site sampling and analysis plan
- Level of activity and sample documentation
- Working order of instruments and equipment
- Level of QC conducted by each field team
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding

- Decontamination procedures
- Level of efficiency which each team conducts planned activities at the site
- Sample packaging and shipment

After the audit, any deficiencies are discussed with the field staff, and corrections are identified. If any of these deficiencies might affect the integrity of the samples being collected, the QA Officer informs the field staff immediately, so corrections can be made. The field performance audit will be conducted at the start of the project, one before the end of the project, and as directed by the project manager. OHM will also submit to all requests by regulatory agencies, or other clients for external field systems audits.

7.3 LABORATORY PERFORMANCE AUDIT

The laboratory performance audit verifies the ability of the laboratory to correctly identify and quantitate compounds in blind check samples submitted by an auditing agency. If the laboratory participates in Performance Evaluation (PE) programs such as USEPA WS/WP studies, AIHA, PAT studies, etc., results from these studies will be generally acceptable by OHM. However, during the course of the project, it may be necessary for the Project QA/QC Officer to send PE samples to the laboratory to evaluate specific parameters.

The contracted laboratories will undergo performance audits throughout the project consisting of field QC samples. Occasionally PE samples will be supplied by the client or external organizations which will be spiked with the same analytical parameters that are being investigated on site. External laboratory performance audits by auditing agencies such as the USEPA, USACE-MRD, DOD, NFESC, etc., are not routinely scheduled. However OHM and its subcontracted laboratories will submit to any external audit upon request by the USEPA or the client.

7.4 LABORATORY SYSTEM AUDITS

The laboratory system audit is a review of analytical laboratory operations to verify that the facility has the necessary equipment, staff, and procedures in place to generate acceptable data. It is also to determine that each element within an activity is functioning appropriately and within the guidelines of applicable methodology, approved procedures, and the site QAPP. An on-site inspection is routinely performed by the laboratory's QA Manager and may also be frequently performed by the OHM Project Chemical QA/QC Officer. If the laboratory participates in certification programs, audits performed by the certifying agencies may satisfy the criteria of systems audits for the project.

If the laboratory is in question, a system audit can be directed by the client and performed by OHM or the client's representative. Any recommendations made will be considered for implementation and any corrective actions will be taken to correct any deficiencies found. Project-specific audit reports will be placed in the project files and laboratory audit reports will be kept by the laboratory for future reference.

8.0 CORRECTIVE ACTION

This Corrective actions may be necessary as a result of the following QA activities:

- Field and laboratory performance audits
- Field and laboratory system audits
- Inter-laboratory comparison studies
- Calibration data fall out of specified limits
- Failure to adhere to the CQMP
- Failure to adhere to the site
- Failure to adhere to standard operating procedures and methods
- Data completeness below required limits
- Control limits are exceeded for QC samples

If, during system and performance audits, deficiencies or problems are discovered, corrective action will be initiated immediately. The appropriate field and laboratory personnel will be notified immediately and an investigative process will be implemented immediately to find solutions to these issues. The investigative process will consist, but is not limited to, the following:

- Determining when the problem occurred
- Determining which systems were affected by the problem
- Determining the cause of the problem
- Determining a corrective action to eliminate the problem
- Assigning the responsibility for implementing the corrective action
- Implementing the corrective action
- Evaluating the effectiveness of the corrective action
- Investigating alternative corrective actions if the original action was not sufficient in eliminating the problem
- Documenting that the corrective action has eliminated the problem

The Project Chemical QC Officer has the authority to require that all site activities threatened by the problem be stopped or limited until the corrective action has been implemented and satisfactorily verified to eliminate the problem.

Corrective actions may include, but is not limited to:

- Modifications to procedures
- Recalibration of instruments

- Replacement of solvents, reagents, and/or standards
- Additional training of personnel
- Reassignment of personnel

8.1 CORRECTIVE ACTION REPORT

A Corrective Action Report (CAR) is necessary documentation of the investigative process. Depending on the issues, the CAR may be generated by the laboratory or the field personnel. Copies of the CAR will be given to the Project QC Officer and Project Manager, who will distribute it to the client. A copy of the CAR will be placed in the project files for future reference.

The CAR should include, but is not limited to:

- A description of the problem, deficiency, or issue
- Proposed resolutions
- Resulting actions
- Effectiveness of the resolutions
- Personnel responsible for implementation of the corrective actions
- Personnel responsible for monitoring the effectiveness of the actions.

8.2 QUALITY ASSURANCE REPORT

The Project Manager, Project QC Officer, and Project Chemist will converse on a regular basis to review possible and potential problem areas and to ensure that all QA/QC procedures are being carried out. It is important that all data abnormalities be investigated to ensure that they are not a result of operator or instrument deviation but are a true reflection of the methodology or task function. The project final report will contain a separate section that covers the data quality and validity. At a minimum, the following information will be included in the report:

- Assessment of measurement data precision, accuracy, and completeness
- System and performance audit results
- Significant QA problems and corrective actions implemented
- Copies of documentation such as memos, reports, etc.

The Project QC Officer will be responsible for preparing this report weekly or daily, as well as monthly written QA reports to OHM QA management. The Regional QA/QC Director will be responsible for reviewing and approving these monthly reports. Verbal reports will be made on a more frequent basis. All reports will be made available to the Project Manager, client, and regulating agencies. If no project audits were performed and no significant QA/QC problems occurred, a letter stating these facts will be submitted to the referenced parties in lieu of a QA Report.

APPENDIX A

TABLE A-1 SAMPLING SUMMARY
TABLE A-2 PROJECT QUALITY CONTROL OBJECTIVES

TABLE A-1 SAM G SUMMARY

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT	QC Level	Req[illegible] Analysis	Analytical Method	Holding Time	Sample Preservation	Containers
Contaminated Area Perimeter	Perimeter Sampling (24 soil borings) select sample with highest VOC conc by field screening	Soil	One sample per boring (six borings per hot spot) to establish baseline	24+3 Dup total 27	Grab	Split spoon, SS spoon	14 Days	OHM Min	Volatile Organic Analytes	8260B	14 Days	Cool to 4°C	1ea 4 oz and 1ea 8 oz jars with Teflon Septa Cap 1ea EnCore Sampler
Contaminated Area Well Installation	One Sample from each SVE well boring (22 new SVE Wells)	Soil	Once during well installation	22+3dups total 25	Grab	Split spoon, SS spoon	14 Days	OHM Min	Volatile Organic Analytes	[illegible]	14 Days	Cool to 4°C	1ea 4 oz and 1ea 8 oz jars with Teflon Septa Cap 1ea EnCore Sampler
Contaminated Area Monitoring	One Sample from each of 4 borings at hot spots 1,2,and 4	Soil	After 3 months of system operation	12+2dups total 14	Grab	Split spoon, SS spoon	14 Days	OHM Min	Volatile Organic Analytes	[illegible]	14 Days	[illegible]	1ea 4 oz and 1ea 8 oz jars with Teflon Septa Cap 1ea EnCore Sampler
Contaminated Area Verification	One Sample from each of 4 borings at hot spots 1,2,3,and 4	Soil	After 12 months of system operation	16+2dups total 18	Grab	Split spoon SS spoon	14 Days	[illegible]	Volatile Organic Analytes	[illegible]	[illegible]	[illegible]	1ea 4 oz and 1ea 8 oz jars with Teflon Septa Cap 1ea EnCore Sampler
QA/QC		Water	Once during every round of sampling	1 Rinsates	Grab	Direct Fill	14 Days	[illegible]	Volatile Organic Analytes	[illegible]	[illegible]	Cool to 4°C	2ea 40 ml vials with Teflon Septa Cap
QA/QC		Water	Once during every round of sampling	Trip Blank		Laboratory Supplied	14 Days	[illegible]	Volatile Organic Analytes	[illegible]	14 Days	[illegible]	1ea 40 ml vials with Teflon Septae Cap
Extraction System	Influent and Effluent of the Moisture Separator	Water	Once during system start up and once there after	4	Grab	With disposable bailer	14 Days	[illegible]	Volatile Organic Analytes	[illegible]	14 Days	HCL to pH < 2 Cool to 4°C	2ea 40 ml vials with Teflon Septa Cap

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OU2 Site
Project [illegible] 17488
DO 080

TABLE A-1 SAM[illegible]G SUMMARY

[illegible]

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT	QC Level	Required Analysis	Analytical Method	Holding Time	Sample Preservation	Containers

Table A-1Continued.....

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT	QC Level	Required Analysis	Analytical Method	Holding Time	Sample Preservation	Containers
System Influent and Effluent	Influent and effluent of GAC unit	Air	Once during system start-up to establish baseline and to identify the need for additional gas treatment	2	Grab	SUMMA Vaccum Sampler	48 hr	OHM Min	Volatile Organic analytes	TO-14	14 Days	None	SUMMA Canister
									Vinyl Chloride	Drager	Not Applicable	None	Drager Tubes
System Effluent	Effluent	Air	Daily for 7 days to determine Drager tube correlation		Grab	SUMMA Vaccum Sampler	48 hr	OHM Min	Volatile Organic Analytes	TO-14	14 Days	None	SUMMA Canister
									Vinyl Chloride	Drager	Not Applicable	None	Drager Tubes
Long term System Operation	System Influent and Effluent	Air	Weekly for weeks 2 and 3 to determine need for treatment and rate of carbon consumption	4	Grab	SUMMA Vaccum Sampler	48 hr	OHM Min	Volatile Organic Analytes	[illegible]	14 Days	None	SUMMA Canister
									Vinyl Chloride	Drager	Not applicable	None	Drager Tubes
Long term System Operation	System Influent	Air	Weekly for weeks 4 to 8 (to monitor contaminant removal), monthly after that for 22 months	28 + 3dups total 31	Grab	SUMMA Vaccum Sampler	48 hr	OHM Min	Volatile Organic Analytes	TO-14	14 Days	None	SUMMA Canister

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Project No 17488
DO 080

TABLE A-1 SAM G SUMMARY

Table A-1Continued.....

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT	QC Level	Required Analysis	Analytical Method	Holding Time	Sample Preservation	Containers
Well Vapor Effluent	Individual well head (36 total wells) System Influent Effluent	Air	Periodically & to check for GAC breakthrough	Twice per Week (Min)	Grab	Direct Analysis	ASAP	Screening Level Non definitive	Total Volatiles	Field Test Equipment	Not applicable	None	FID Vapor Monitor
									Vinyl Chloride	[illegible]	Not applicable	None	Draeger Tubes
Water Disposal	Decontamination and purge water	Water	Once during this effort	1	Composite	Disposable bailer	14 Days	OHM NE[illegible]	Volatile Organic analysis	[illegible]	14 Days	[illegible]	2 x 40 ml Vials with Teflon septa Cap
Solid Waste Disposal	Drill cuttings and PPE etc	Soil	Once during the effort	1	Composite	Split spoon SS bowl SS spoon	14 Days	OHM [illegible]	TCLP [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
									TCLP [illegible]	[illegible]	[illegible]		Glass with Teflon cap [illegible]
									TCLP Pesticide	[illegible]	[illegible]		
									TCLP Herbicide	[illegible]	[illegible]		
									TCLP Metal	[illegible]	[illegible]		
									[illegible]	[illegible]	[illegible]		
									[illegible]	[illegible]	[illegible]		
									pH	[illegible]	[illegible]		
									Flash Point				

Notes: FID measurements to be performed whenever SUMMA samples are collected

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No[1]	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
		TCLP	TCLP	TCLP	TCLP	TCLP	TCLP	TCLP
TCLP Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8260B	1,1-Dichloroethylene	0 7	0.1	50-150	<50	70-130	<50	90
8260B	1,2-Dichloroethane	0 5	0.1	50-150	<50	70-130	<50	90
8260B	Benzene	0 5	0.1	50-150	<50	70-130	<50	90
8260B	Carbon Tetrachloride	0 5	0.1	50-150	50	70-130	<50	90
8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	90
8260B	Chloroform	6	1	50-150	50	70-130	<50	90
8260B	Methyl Ethyl Ketone	200	20	50-150	50	70-130	<50	90
8260B	Tetrachloroethylene	0 7	0 7	50-150	50	70-130	<50	90
8260B	Trichloroethylene	0 5	0.1	50-150	<50	70-130	<50	90
8260B	Vinyl Chloride	0 2	0.05	50-150	50	70-130	<50	90
TCLP Semi-Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8270B	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	90
8270B	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	90
8270B	2,4,6-Trichlorophenol	2	0.4	50-150	50	70-130	<50	90
8270B	2,4-Dinitrotoluene	0 13	0 02	50-150	<50	70-130	<50	90
8270B	Cresol	200	40	50-150	50	70-130	<50	90
8270B	Hexachlorobenzene	0 13	0.02	50-150	<50	70-130	<50	90
8270B	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	90
8270B	Hexachlorobutadiene	0 5	0.4	50-150	<50	70-130	<50	90
8270B	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	90
8270B	Pentachlorophenol	100	80	50-150	<50	70-130	<50	90
8270B	Pyridine	5	1	50-150	<50	70-130	<50	90
TCLP Pesticides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8080	Endrin	0.003	0.0005	50-150	<50	70-130	<50	90
8080	Lindane	0 06	0.01	50-150	<50	70-130	<50	90
8080	Methoxychlor	1.4	0.1	50-150	<50	70-130	<50	90
8080	Toxaphene	0 07	0.01	50-150	<50	70-130	<50	90
8080	Chlordane	0 03	0.005	50-150	<50	70-130	<50	90
8080	Heptachlor and its Hydroxide	0 001	0.0005	50-150	<50	70-130	<50	90

Notes
1) SW 846 Methods unless otherwise noted

NS = Not Specified
NA = Not Applicable

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No[1]	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
		TCLP	TCLP	TCLP	TCLP	TCLP	TCLP	TCLP
TCLP Herbicides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8150	2,4-D	1.4	0.1	50-150	< 50	70-130	< 50	90
8150	2,4,5-TP	0.14	0.01	50-150	< 50	70-130	< 50	90
TCLP Metals		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
6010	Arsenic	5	1	50-150	< 50	70-130	50	90
6010	Barium	100	20	50-150	< 50	70-130	< 50	90
6010	Cadmium	1	0.2	50-150	< 50	70-130	< 50	90
6010	Chromium	5	1	50-150	< 50	70-130	< 50	90
6010	Lead	5	1	50-150	< 50	70-130	< 50	90
7470	Mercury	0.2	0.04	50-150	50	70-130	50	90
6010	Selenium	1	0.2	50-150	< 50	70-136	< 50	90
6010	Silver	5	1	50-150	< 50	70-130	< 50	90
Characteristics		(mg/kg)	(mg/kg)	(%)	(%)	(%)	(%)	(%)
7.3	Reactive Sulfide	500	50	N/A	50	N/A	< 50	90
7.3	Reactive Cyanide	250	25	N/A	< 50	N/A	< 50	90
1010	Ignitability (Pensky Martens)	< 60 C or < 140°F	40 C or 100°F	N/A	50	N/A	< 50	90
1020A	Ignitability (Setaflash)	< 60 C or < 140°F	40 C or 100°F	N/A	50	N/A	< 50	90
9040	pH (Corrosivity)	< 2 ; ≥12.5	N/A	N/A	50	N/A	50	90
Miscellaneous				(%)	(%)	(%)	(%)	(%)
9095	Paint Filter	Pass	Pass/Fail	N/A	N/A	N/A	N/A	90

Notes
1) SW 846 Methods unless otherwise noted

NS = Not Specified
NA = Not Applicable

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No[1]	Analyte / Component	Project Action Limits TCLP	Minimum PQL TCLP	Accuracy Limits MS/MSD Recoveries TCLP	Precision Limits MS/MSD Deviation TCLP	Accuracy Limits LCS Recoveries TCLP	Precision Limits Field Dup Deviation TCLP	Completeness Limits TCLP
TCLP Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8260B	1,1-Dichloroethylene	0.7	0.1	50-150	<50	70-130	<50	90
8260B	1,2-Dichloroethane	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Benzene	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Carbon Tetrachloride	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	90
8260B	Chloroform	6	1	50-150	<50	70-130	<50	90
8260B	Methyl Ethyl Ketone	200	20	50-150	<50	70-130	<50	90
8260B	Tetrachloroethylene	0.7	0.7	50-150	<50	70-130	<50	90
8260B	Trichloroethylene	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Vinyl Chloride	0.2	0.05	50-150	<50	70-130	<50	90
TCLP Semi-Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8270B	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	90
8270B	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	90
8270B	2,4,6-Trichlorophenol	2	0.4	50-150	<50	70-130	<50	90
8270B	2,4-Dinitrotoluene	0.13	0.02	50-150	<50	70-130	<50	90
8270B	Cresol	200	40	50-150	<50	70-130	<50	90
8270B	Hexachlorobenzene	0.13	0.02	50-150	<50	70-130	<50	90
8270B	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	90
8270B	Hexachlorobutadiene	0.5	0.4	50-150	<50	70-130	<50	90
8270B	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	90
8270B	Pentachlorophenol	100	80	50-150	<50	70-130	<50	90
8270B	Pyridine	5	1	50-150	<50	70-130	<50	90
TCLP Pesticides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8080	Endrin	0.003	0.0005	50-150	<50	70-130	<50	90
8080	Lindane	0.06	0.01	50-150	<50	70-130	<50	90
8080	Methoxychlor	1.4	0.1	50-150	<50	70-130	<50	90
8080	Toxaphene	0.07	0.01	50-150	<50	70-130	<50	90
8080	Chlordane	0.03	0.005	50-150	<50	70-130	<50	90
8080	Heptachlor and its Hydroxide	0.001	0.0005	50-150	<50	70-130	<50	90

Notes
1) SW 846 Methods unless otherwise noted

NS - Not Specified
NA - Not Applicable

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No[1]	Analyte / Component	Project Action Limits TCLP	Minimum PQL TCLP	Accuracy Limits MS/MSD Recoveries TCLP	Precision Limits MS MSD Deviation TCLP	Accuracy Limits LCS Recoveries TCLP	Precision Limits Field Dup Deviation TCLP	Completeness Limits TCLP
TCLP Herbicides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8150	2,4-D	1 4	0.1	50-150	<50	70-130	<50	90
8150	2,4,5-TP	0 14	0 01	50-150	<50	70-130	<50	90
TCLP Metals		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
6010	Arsenic	5	1	50-150	<50	70-130	<50	90
6010	Barium	100	20	50-150	<50	70-130	<50	90
6010	Cadmium	1	0 2	50-150	<50	70-130	<50	90
6010	Chromium	5	1	50-150	<50	70-130	50	90
6010	Lead	5	1	50-150	<50	70-130	<50	90
7470	Mercury	0 2	0 04	50-150	<50	70-130	<50	90
6010	Selenium	1	0 2	50-150	<50	70-130	<50	90
6010	Silver	5	1	50-150	<50	70-130	<50	90
Characteristics		(mg/kg)	(mg/kg)	(%)	(%)	(%)	(%)	(%)
7 3	Reactive Sulfide	500	50	N/A	<50	N/A	50	90
7 3	Reactive Cyanide	250	25	N/A	<50	N/A	<50	90
1010	Ignitability (Pensky Martens)	< 60°C or < 140°F	40°C or 100°F	N/A	<50	N/A	50	90
1020A	Ignitability (Setaflash)	< 60°C or < 140°F	40°C or 100°F	N/A	<50	N/A	<50	90
9040	pH (Corrosivity)	≤2 ; ≥12 5	N/A	N/A	<50	N/A	<50	90
Miscellaneous				(%)	(%)	(%)	(%)	(%)
9095	Paint Filter	Pass	Pass/Fail	N/A	N/A	N/A	N/A	90

Notes
1) SW 846 Methods unless otherwise noted

NS = Not Specified
NA = Not Applicable

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

		Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
Method No[1]	Analyte / Component	Water	Soil[2]	Water	Soil[2]	Water	Soil[2]	Water	Soil[2]	Water	Soil[2]	Water	Soil[2]	Water	Soil[2]
	TCL VOLATILES BY GC/MS	ug/L	ug/kg	ug/L	ug/kg	%	%	%	%	%	%	%	%	%	%
8260B	Chloromethane	NS	6.7	1.3	6	60-140	20-150	<30	<50	38-116	38-116	<50	<75	95	90
8260B	Bromomethane	NS	NS	1.1	5	60-140	20-150	<30	<50	49-117	49-117	<50	<75	95	90
8260B	Vinyl Chloride	NS	0.09	1.1	9*	60-140	20-150	<30	<50	31-121	31-121	<50	<75	95	90
8260B	Chloroethane	NS	13600	1	5	60-140	20-150	<30	<50	62-116	62-116	<50	<75	95	90
8260B	Methylene Chloride	NS	21.9	0.3	2	60-140	20-150	<30	<50	55-126	55-126	<50	<75	95	90
8260B	Acetone	NS	2810	10	10	60-140	20-150	<30	<50	43-165	43-165	<50	<75	95	90
8260B	Carbon Disulfide	NS	4940	10	10	60-140	20-150	<30	<50	76-119	76-119	<50	<75	95	90
8260B	1,1-Dichloroethene	NS	44.5	1.2	6	60-140	20-150	<30	<50	54-128	54-128	<50	<75	95	90
8260B	1,1-Dichloroethane	NS	3521	0.4	2	60-140	20-150	<30	<50	62-141	62-141	<50	<75	95	90
8260B	cis-1,2-Dichloroethene	NS	350	1.2	6	60-140	20-150	<30	<50	70-131	60-141	<50	<75	95	90
8260B	trans-1,2-Dichloroethene	NS	NS	0.6	3	60-140	20-150	<30	<50	61-138	51-148	<50	<75	95	90
8260B	Chloroform	NS	0.96	0.3	2*	60-140	20-150	<30	<50	65-129	65-129	<50	<75	95	90
8260B	1,2-Dichloroethane	NS	1.7	0.6	3*	60-140	20-150	<30	<50	68-135	68-135	<50	<75	95	90
8260B	2-Butanone	NS	687	10	10	60-140	20-150	<30	<50	50-163	50-163	<50	<75	95	90
8260B	1,1,1-Trichloroethane	NS	1484	0.8	4	60-140	20-150	<30	<50	68-135	68-135	50	<75	95	90
8260B	Carbon Tetrachloride	NS	2.74	2.1	10*	60-140	20-150	<30	<50	67-125	67-125	<50	<75	95	90
8260B	Bromodichloromethane	NS	2.9	0.8	4*	60-140	20-150	<30	<50	68-135	58-145	50	<75	95	90
8260B	1,2-Dichloropropane	NS	2.8	0.4	2	60-140	20-150	<30	<50	76-132	76-132	<50	<75	95	90
8260B	Cis-1,3-Dichloropropene	NS	0.9	1	5*	60-140	20-150	30	<50	70-122	70-12[illegible]	<50	<75	95	90
8260B	Trichloroethylene	NS	18.3	1	10	60-140	20-150	<30	50	67-137	67-137	<50	<75	95	90
8260B	Dibromochloromethane	NS	0.69	0.5	3*	60-140	20-150	<30	<50	64-120	64-120	<50	<75	95	90
8260B	1,1,2-Trichloroethane	NS	0.96	1	5*	60-140	20-150	<30	<50	70-141	70-141	<50	<75	95	90
8260B	Benzene	NS	5.6	0.4	2	60-140	20-150	<30	<50	51-139	51-139	<50	<75	95	90
8260B	trans-1,3-Dichloropropene	NS	0.9	1	5*	60-140	20-150	<30	<50	42-154	42-154	<50	<75	95	90
8260B	Bromoform	NS	1.25	1.2	6*	60-140	20-150	<30	<50	67-129	67-129	<50	<75	95	90
8260B	4-Methyl-2-Pentanone	NS	2500	10	20	60-140	20-150	<30	<50	77-1[illegible]	77-119	<50	<75	95	90
8260B	2-Hexanone	NS	760	10	20	60-140	20-150	<30	<50	47-165	47-165	<50	<75	95	90
8260B	Tetrachloroethylene	NS	5.9	1.4	7	60-140	20-150	<30	<50	67-131	67-131	<50	<75	95	90
8260B	Toluene	NS	7275	1.1	5	60-140	20-150	<30	<50	31-137	31-137	<50	<75	95	90
8260B	1,1,2,2-Tetrachloroethane	NS	0.31	0.4	2*	60-140	20-150	<30	<50	55-138	55-138	<50	<75	95	90
8260B	Chlorobenzene	NS	432	0.4	2	60-140	20-150	<30	<50	69-140	69-140	<50	<75	95	90
8260B	Ethylbenzene	NS	241	0.6	3	60-140	20-150	<30	<50	59-140	59-140	<50	<75	95	90
8260B	Styrene	NS	2242	0.4	2	60-140	20-150	<30	<50	71-133	71-133	<50	<75	95	90
8260B	Xylenes, Total	NS	4958	3.3	15	60-140	20-150	<30	<50	68-133	68-133	<50	<75	95	90
8260B	4-Bromofluorobenzene (Surr)					75-125	65-135								
8260B	1,2-Dichloroethane-d4 (Surr)					62-139	52-149								
8260B	Toluene-d8 (Surr)					75-125	65-135								

* Action level above PQL

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No[1]	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits Audit Accuracy Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
		Air	Air	Air	Air	Air
TCL VOLATILES IN AIR BY GC/MS		ppbv	ppbv	%	%	%
TO-15	Acetone	NS	100	70-130	<30	95
TO-15	Benzene	NS	5	70-130	<30	95
TO-15	Bromoform	NS	5	70-130	<30	95
TO-15	Bromomethane	NS	5	70-130	<30	95
TO-15	2-Butanone	NS	10	70-130	<30	95
TO-15	Carbon Disulfide	NS	100	70-130	<30	95
TO-15	Carbon Tetrachloride	NS	5	70-130	<30	95
TO-15	Chlorobenzene	NS	5	70-130	<30	95
TO-15	Chlorodibromomethane	NS	5	70-130	<30	95
TO-15	Chloroethane	NS	5	70-130	<30	95
TO-15	2-Chloroethyl Vinyl Ether	NS	10	70-130	<30	95
TO-15	Chloroform	NS	10	70-130	<30	95
TO-15	Chloromethane	NS	5	70-130	<30	95
TO-15	1,1-Dichloroethane	NS	10	70-130	<30	95
TO-15	1,2-Dichloroethane	NS	5	70-130	<30	95
TO-15	1,1-Dichloroethene	NS	5	70-130	<30	95
TO-15	Cis-1,2-Dichloroethene	NS	5	70-130	<30	95
TO-15	Trans-1,2-Dichloroethene	NS	5	70-130	<30	95
TO-15	1,2-Dichloropropane	NS	5	70-130	<30	95
TO-15	Cis-1,3-Dichloropropene	NS	5	70-130	<30	95
TO-15	Trans-1,3-Dichloropropene	NS	5	70-130	<30	95
TO-15	Ethylbenzene	NS	5	70-130	<30	95
TO-15	2-Hexanone	NS	50	70-130	<30	95
TO-15	Methylene Chloride	NS	5	70-130	<30	95
TO-15	4-Methyl-2-Pentanone	NS	50	70-130	<30	95
TO-15	Styrene	NS	5	70-130	<30	95
TO-15	1,1,2,2-Tetrachloroethane	NS	5	70-130	<30	95
TO-15	Tetrachloroethylene	NS	5	70-130	<30	95
TO-15	Toluene	NS	5	70-130	<30	95
TO-15	1,1,1-Trichloroethane	NS	5	70-130	<30	95
TO-15	1,1,2-Trichloroethane	NS	5	70-130	<30	95
TO-15	Trichloroethylene	NS	5	70-130	<30	95
TO-15	1,2,3-Trichloropropane	NS	5	70-130	<30	95
TO-15	Vinyl Acetate	NS	50	70-130	<30	95
TO-15	Vinyl Chloride	NS	10	70-130	<30	95
TO-15	Xylenes, Total	NS	5	70-130	<30	95

APPENDIX B

CUSTODY SEAL
CHAIN-OF-CUSTODY RECORD
OHM SHIPPING LABEL
SHIPPING INSTRUCTIONS FOR SENDING SAMPLES TO THE LABORATORY

Client ______________________

Sample ID ______________________

Location ______________________

Analysis ______________________

Preservative ______________________

Collection Date/Time ______________________

Collected By ______________________

CUSTODY SEAL

Person Collecting Sample ______________________ Sample No. ______________

(signature)

Date Collected ______________________ Time Collected ______________

Custody Seal Sample Label	OHM Remediation Services Corp.

OHM Remediation Services Corp
Subsidiary of OHM Corporation
U.S. Route 224 East • Findlay, Ohio 45840 • (419) 423-3526

CHAIN-OF-CUSTODY RECORD

LABORATORY COPY
205391

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25)

Item	Sample Identifier (26)	Matrix (27)	Date (28)	Time (29)	Preserved (30)	# of Cont. (31)	QC Level (32)	TAT (33)	Analyses (34)								Comments (35)
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

(36) (37) (38) (39) (40) (41)

Distribution: White - Laboratory (To be returned with Analytical Report), Goldenrod - Project File, Yellow - Project Data Manager

(45)

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

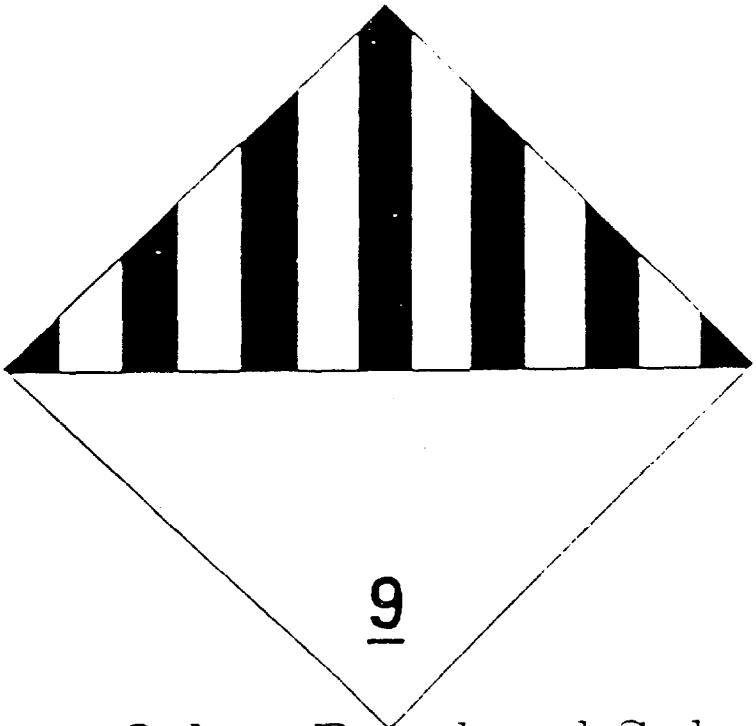
(42) Sample Point Location	(43) Sample Type G	C	F	QC

Comments (44)

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

CHAIN OF CUSTODY RECORD

OHM Corporation



OHM Corporation

From

Phone

To

Phone

Other Regulated Substances, ID# 8027

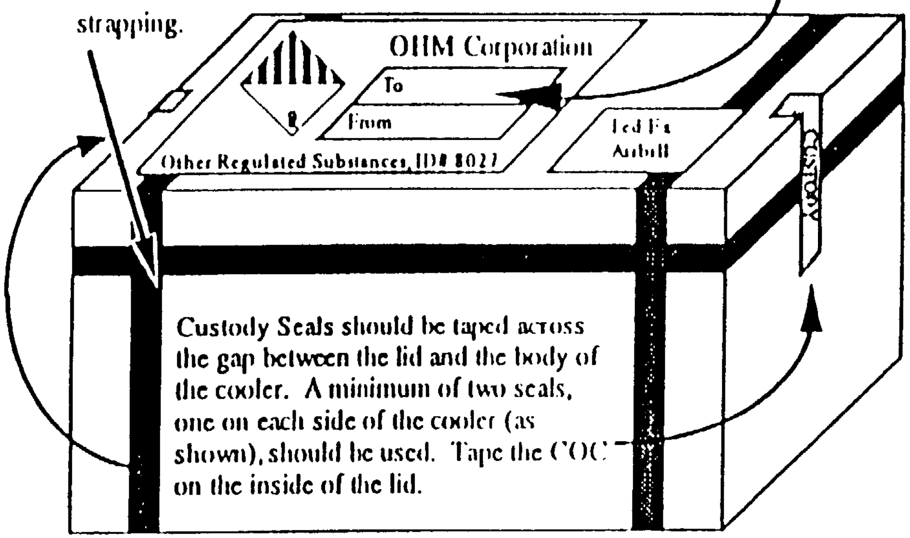
OHM Remediation Services Corp

Shipping Instructions: Sending Samples to the Lab

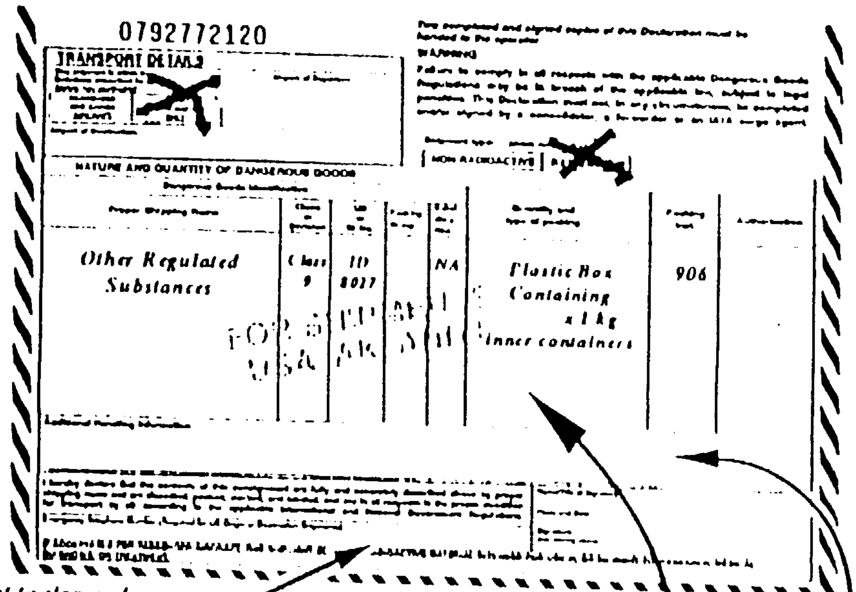
NOTE: These procedures are ONLY for shipping unknown environmental samples such as sludge, soil, or water samples for laboratory analysis and identification; Materials which are known to be explosive, compressed gases, flammable, oxidizers, poisons, radioactive, or corrosive cannot be shipped by this method. Call the Regional T&D Coordinator for help in that case. Drum or tank materials must be shipped as per the Regional T&D Coordinator's instructions.

Cooler lid is taped closed and additional tape should be used around the outside to act as strapping.

OHM custom sample shipping label



Lower Portion of Fed Ex DANGEROUS GOODS airbill



1) Samples must be shipped in "Strong outer packaging". Fed Ex stated that a rigid plastic cooler like we are currently using would be acceptable.

2) Use one of OHM's custom sample shipping labels. The To/From address portion of the label should be filled out completely including phone numbers. This label should be placed on last and cannot be covered by tape, the Fed Ex airbill or anything else. This label should go on the TOP of the cooler.

3) Inner packages cannot exceed 1 gallon each, and the entire shipment (cooler & samples) cannot exceed 66 lb.

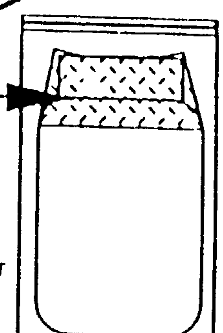
4) Coolers must be packed with absorbent material (vermiculite or kitty litter) which will absorb any spills or leaks, not react with the sample contents, and which will minimize the chance that inner containers will break. The coolers should also be fastened shut securely using tape or strapping. See the SAP for special instructions.

5) Inner containers should have their lids securly closed and packed in a ziplock baggie to prevent leaks.

6) The materials must be shipped using a Federal Express Hazardous Materials Airbill. Use the example above or call the Hazardous Materials group at Federal Express at (800) GO-FEDEX for more instructions on filling out this form.

7) The COC must be filled out completely, placed in a gallon zip lock baggie, and taped to the inside lid of the cooler. A copy of the COC should be placed behind the airbill in the pouch on the outside of the cooler.

Don't forget to sign and include the 24-hr Emergency Response Phone number. Check with the Regional T&D Coordinator for this number



Lids are taped to prevent leaks or loosening. Entire jar is sealed in a zip lock baggie

Fill in the blank with the number of containers

___ x 1 kg for quart jars
___ x 500 g for 8 oz jars
___ x 40 g for VOA vials

Fill in the Additional Handling space with:

"Samples from OHM Job # ______ see attached chain of custody. In case of emergency refer to ICAO Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods drill #9A"

READ THE DIRECTIONS ON THE AIRBILL SO YOU UNDERSTAND WHAT YOU ARE FILLING OUT. Fill out the Fed-Ex airbill completely. Don't forget to sign the bottom and include the Emergency Response phone number. Changing even one thing from the example above may mean that Fed-Ex will refuse to accept the shipment. This procedure has been checked out with Fed-Ex several times. If a driver refuses to pick it up make sure you have filled out the airbill right and followed ALL the instructions before you complain.

APPENDIX C

SUPELCO 2 LITER SAMPLE MANUAL

Supelco's
2 Liter Air Sampler
Model 1060

Operations Manual

CAUTION:
Read rules for safe operation carefully.

SUPELCO, INC.

Supelco Park • Bellefonte, PA • 16823-0048 • USA
Phone (814) 359-3441 TWX 510-670-3600 FAX 814-359-5459

2 Liter Air Sampler, Model 1060

This active vacuum chamber-based sampler can fill a sample bag **without** the sample gas going through the vacuum pump. This sampler is best used for quick sample volume collections. This portable sampler can collect an air sample from a vacuum system up to 80" H_2O. Sampler has a see through window and an external pump module with a rechargeable battery. Applications include environmental soil vapor clean up, indoor and outdoor monitoring, and ambient VOC sampling. Sampler includes a 1.9 liter/min vacuum pump, 12volt rechargeable battery, light weight water tight enclosure with carry strap, and needle valve for coarse fill rate control.

Features and Specifications

- 1-2 liter bag capacity
- Zero pump contamination design
- Sample inlet: 1/4in. OD tubing
- Direct vacuum force: 80in.(202cm) H_2O
- Continuous running time: 8 hrs.
- Rechargeable 12volt-1.2amphr battery
- Vacuum filling rate: 1.9L/min.
- Metering needle valve for coarse fill rate control
- Dimensions: 9" x 9" x 6" (24cm x 23cm x 15cm)
- Weight: 5 lbs. (2.27kg)

Model 1060 2-4622

Optional Parts

1-liter Tedlar® Bags, pk. of 10	2-4633
2-liter Tedlar® Bags, pk. of 10 with push/pull polypropylene valve & septum port	2-4654
Battery, 12 volt-1.2amphr	2-4635
Battery Charger, 110VAC	2-4643
Battery Charger, 220VAC	2-4679

RULES FOR SAFE OPERATION

1. Do not recharge battery in an explosive environment.
2. Do not over fill sample bag. The vacuum pump is strong enough to break the sample bag.
3. Exercise extreme caution when filling sample bag with explosive gases.

2 Liter Air Sampler, Model 1060

CE COMPLIANCE: The Model 1060 bears the CE mark and is in compliance with the EMC Directive 89/336/EEC and its Standards EN 50081-1 and EN 50082-1.

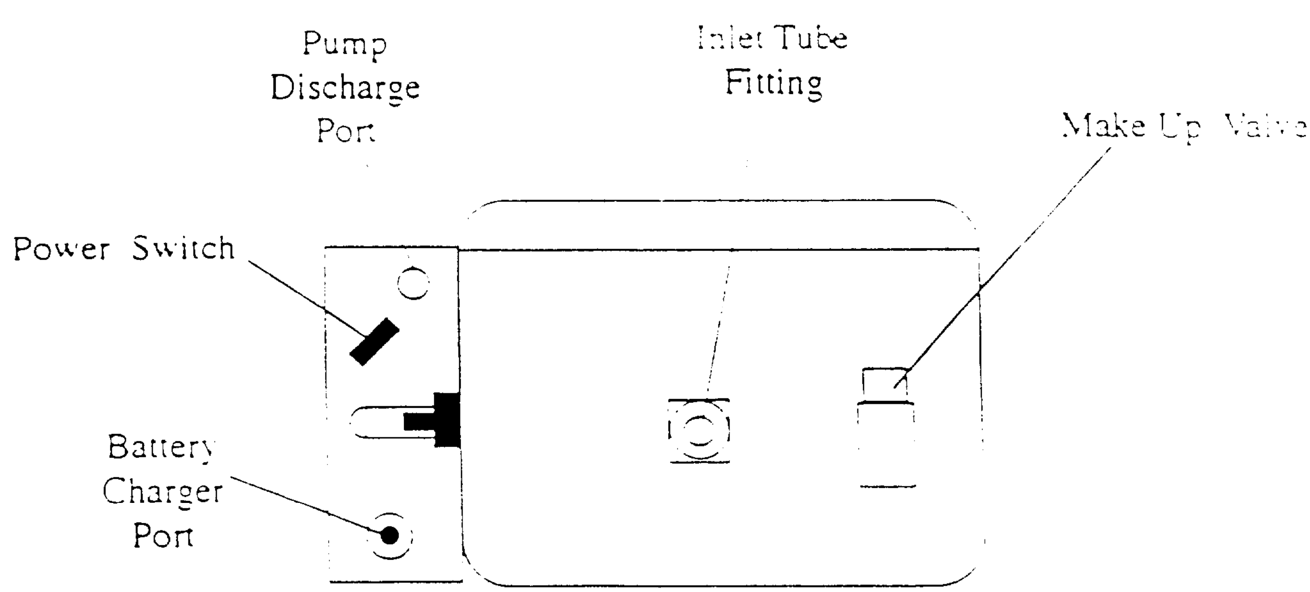
SAMPLE PREPARATION AND COLLECTION:

The principal of operation of this portable sampler is to fill a sample bag by exposing the outside of the sample bag to a vacuum force which causes the bag to fill.

1. Place the sample bag inside sampler.
2. Insert a 6" long piece of 1/4"ODX1/8"ID Tygon© tubing through the Inlet Tube Fitting.
3. Adjust lenght of tubing so half of the tubing is inside the sampler.
4. Tighten the inlet tube fitting just enough to create a seal around the Tygon© tubing.
5. Attach the inside portion of the Tygon© tubing to the inlet valve on the sample bag.
6. Open sample valve on the sample bag and close the lid of the sampler.
7. Make sure the Purge Valve is closed(Closed for fastest fill rate. Open to slow fill rate..Turn on the sample pump

To ensure proper sample bag preparation, fill & empty the new sample bag with a clean gas. To empty the sample bag using the sampler pump: disconect the tubing at the Outlet Vacuum Port; Attach a short piece of 1/4"ODX1/8"ID Tygon© tubing from the Pump Discharge Port to the Outlet Vacuum Port to create a presure inside the sample camber. Fill pre purged sample bag for analysis. Turn off sample pump, open Purge Valve, open sampler lid, CLOSE SAMPLE BAG VALVE and remove sample bag from inlet tubing.

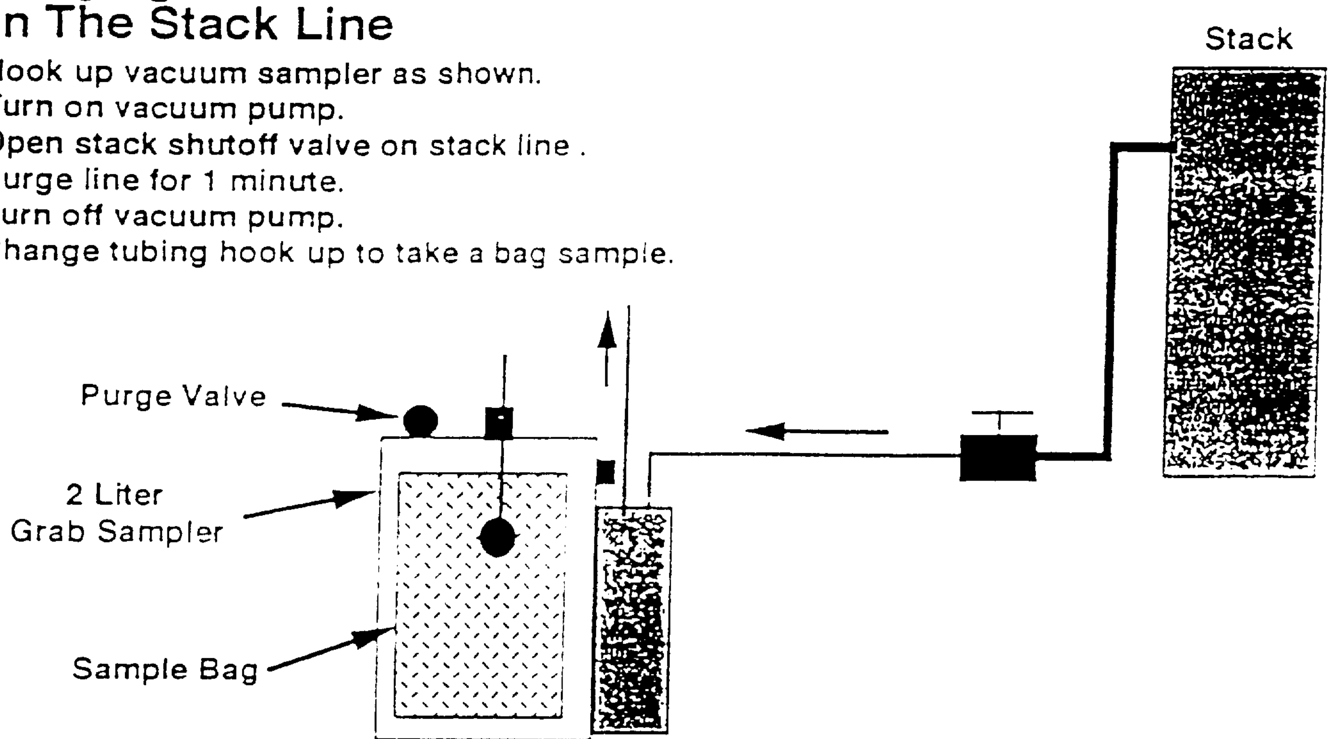
CAUTION: It is recommended that you give the battery an overnight charge after six hours of use.



Stack Sampling

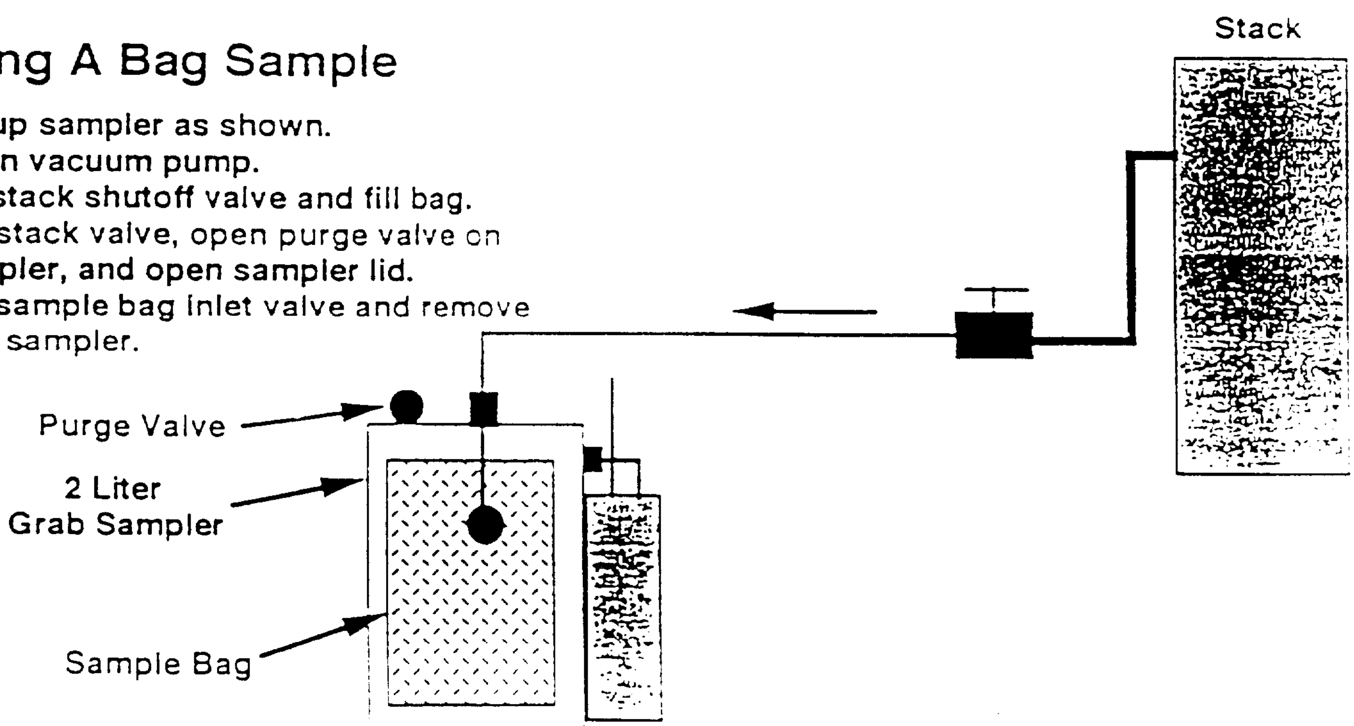
Purging The Dead Volume In The Stack Line

Hook up vacuum sampler as shown.
Turn on vacuum pump.
Open stack shutoff valve on stack line .
Purge line for 1 minute.
Turn off vacuum pump.
Change tubing hook up to take a bag sample.



Taking A Bag Sample

Hook up sampler as shown.
Turn on vacuum pump.
Open stack shutoff valve and fill bag.
Close stack valve, open purge valve on sampler, and open sampler lid.
Close sample bag inlet valve and remove from sampler.



2-N-1 VALVE - OPERATING INSTRUCTIONS

NOTE: Valve stem outer diameter is 3/16" and is suitable for use with 3/16" ID tubing.
Bags are supplied with the valve in the CLOSED position.

FIRST: Lay bag flat on a clean, hard surface with valve stem facing upward.

TO OPEN VALVE: PUSH stem into the valve body until it stops. The valve is now OPEN. Bags are supplied with the valve stem in the CLOSED (PULLED OUT) position.

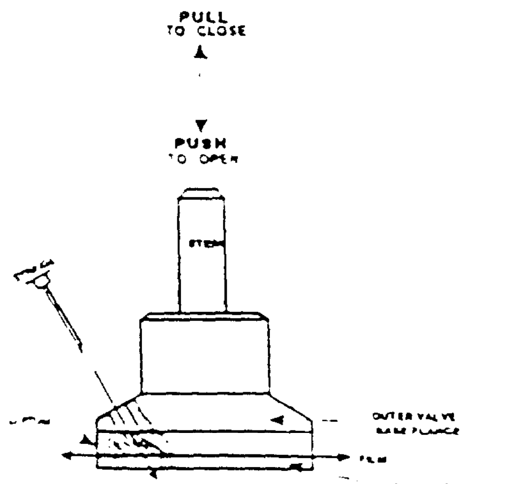
TO CONNECT TUBING: Support bag on a clean, flat surface. Place 3/16" ID tubing over end of stem and push tubing onto stem to appropriate overlap distance (1/8" to 1/4").

TO CLOSE VALVE: PULL stem outward until it stops. Stem will remain in the closed position unless force is applied to push the stem in. The valve is now CLOSED.

TO DISCONNECT TUBING: Pull tubing upward off stem or cut off tubing just above stem.

TO PREVENT ACCIDENTAL SAMPLE LOSS: Make sure objects do not push stem inward during shipment.

SYRINGE SAMPLING: Insert end of needle through small hole in Outer Valve Base Flange at an angle perpendicular to its SLOPED wall (see drawing below). Penetrate PTFE/silicone septum, allowing needle to enter bag through larger hole in Inner Valve Flange. Visual inspection of both the Outer and Inner Flange before inserting the needle will insure proper alignment of the needle. Take care to not puncture the opposite wall of the bag when inserting the needle.



2·N·1 VALVE

APPENDIX D

SOPs

OEM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD

Document # QP-650	Title Standard Analytical Data Deliverable Requirements

APPROVAL

Name	Title	Signature	Date
Guy Galletto	Midwest Region FAS Manager	[illegible]	[illegible]
Emma Popek	Western Region FAS Manager		
Ron Kenyon	Eastern Region FAS Manager	[illegible]	[illegible]
Terry Whitt	Southern Region FAS Manager	[illegible]	[illegible]
Mary Schneider	Southwestern District FAS Manager	Mary Schneider	[illegible]

REVISION RECORD

Ltr.	Date	Change Description	Initials						
1		Issue							
2									
3									
4									
5									
6									
7									
8									
9									
10									

OHM Corporation

STANDARD OPERATING PROCEDURE

Title: Standard Analytical Data Deliverable   Document # QP-650

Date Issued: June 20, 1996   Rev: 0   Date:

1.0 PURPOSE

1.1 The purpose of this procedure is to set forth guidelines for the standardization of hard copy analytical data packages provided to OHM by Analytical Laboratories. This procedure defines the specific deliverable requirement to be included when minimum data packages, standard data packages and maximum data packages are requested by OHM employees.

2.0 SCOPE

2.1 These procedures apply to all purchases of analytical services and the analytical data packages provided to OHM by all analytical laboratories.

3.0 RELATED DOCUMENTS

3.1 HAZWRAP, July 1990. Quality Control Requirements for Field Methods DOE/HWP69/R1.

3.2 HAZWRAP, July 1988. Requirements for Quality Assurance of Analytical Data, DOE/HWP-65, Rev. 0, July 1988.

3.3 USEPA, Test Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846

3.4 United States Environmental Protection Agency, 1984. User's Guide to the Contract Laboratory Program, Office of Emergency and Remedial Response, Washington, D.C.

4.0 GENERAL INFORMATION

4.1 In the past OHM has experienced that each analytical laboratory has a different report format that they call their standard deliverable package. Many times the laboratory's standard deliverable package does not include all of the information required to meet our client's expectations in performing data assessment and data validation of the analytical deliverable. When the additional information has been requested from the laboratories often additional charges are levied. In order to better service our client and to assure each and every laboratory bid for a given set of samples understands precisely what is required to be included within each analytical report, the following procedures have been developed.

5.0 DEFINITIONS

5.1 Accuracy - A measure of how close a measured value is to a known true value.

5.2 Aliquot - A measured portion of a sample taken for analysis.

5.3 Analytical Batch - Batch size is determined by the analytical method and project specific quality assurance requirements. Batch size is usually set at 20 or less samples of the same matrix being analyzed for the same parameters at the same time. All samples in a batch are prepared and analyzed together with a basic set of QC samples. Specific project requirements are listed in the Quality Assurance Project Plan (QAPP).

5.4 Background Correction - A technique usually employed relative to metals analysis which compensates for variable background contribution to the instrument signal in the determination of trace elements.

5.5 Blank - An artificial sample designed to monitor the introduction of artifacts into the measurement process.

5.6 Calibration - The systematic determination of the relationship of the response of the measurement system to the concentration of an analyte of interest.

5.7 Chain-of-Custody - A form used to track the custody of the samples from the time they are taken until the time they are analyzed.

5.8 Continuing Calibration - Subsequent checks on the instrument calibration performed throughout the analysis of samples.

5.9 Data Assessment - A systematic review of the analytical data to assure all method specific requirements were performed.

5.10 Data Quality Objectives - The established quality of the data required to support specific decisions or regulatory actions. DQOs must take into account sampling considerations as well as analytical protocols.

5.11 Data Validation - A systematic effort to review data for identification of errors for the purpose of flagging suspected values to assure the validity of the data for the user.

5.12 Deliverables - Analytical Report Package provided by the analytical laboratory which includes the analytical data and a specified set of supporting documentation.

5.13 Hold Times - The time stipulated in the method or regulations which is allowed to elapse from the time of sampling to the time of extraction and/or analysis. Samples analyzed after the hold times are of questionable usefulness.

5.14 ICP - Inductively coupled argon plasma (also referred to ICAP). An instrument used for metals analysis.

5.15 Internal Standard - A compound added to every standard, blank, matrix spike, matrix spike duplicate, sample and/or sample extract at a known concentration, prior to analysis. Internal standards are used as the basis for quantification of the target compounds.

5.16 Initial Calibration - Instrument calibration performed before any samples are analyzed.

5.17 Laboratory Control Sample - An artificial sample usually prepared in the laboratory, which either contains all or some of the compounds of interest. The sample is processed through the entire procedure including sample preparation and analysis. This sample is used to verify that the method is being performed properly. One laboratory control sample should be analyzed with each analytical batch.

5.18 Matrix Spike - An aliquot of a sample that has been spiked with a known quantity of specified compounds of interest. The matrix spike is used to measure the accuracy of the analytical system.

5.19 Matrix Spike Duplicate - A second aliquot of the same sample used for the matrix spike spiked the same way as the matrix spike. The matrix spike duplicate is used to measure the precision of the analytical system.

5.20 Maximum Deliverable Package - Specific requirements set forth in this document to be provided to OHM by the analytical laboratory when a Maximum Deliverable Package is requested.

5.21 Minimum Deliverable Package - Specific requirements set forth in this document to be provided to OHM by the analytical laboratory when a Minimum Deliverable Package is requested.

5.22 Precision - A measure of the analytical method's ability to reproduce analytical results.

5.23 Preparation Logs - An official laboratory record of the sample preparation procedures used in processing a sample prior to analysis

5.24 Standard Deliverable Package -Specific requirements set forth in this document to be provided to OHM by the analytical laboratory when a Standard Deliverable Package is requested.

5.25 Surrogate - An organic compound that is similar to the analytes of interest in chemical composition, extraction and chromatography, but are not normally found in environmental samples. These compounds are spiked into quality control samples, calibration and check standards, and samples prior to analysis.

5.26 Tentatively Identified Compounds (TICs) - Compounds detected in samples that are not target compounds. Usually TICs consist of up to 30 peaks identified that are greater than 10 percent of the peak areas or heights of the nearest internal standard are subjected to mass spectral library searches for tentative identification.

5.27 Tuning - A technique used in gas chromatography/mass spectrometry procedures to verify that the instrument is properly calibrated to produce reliable mass spectral information.

6.0 RESPONSIBILITIES

6.1 Regional Field Analytical Manager - Responsible for the management of the Regional Field Analytical Department. Responsible for distributing these requirements to all subcontract laboratories used within their region.

7.0 PROCEDURE

7.1 All laboratories providing analytical services to OHM will be provided with a copy of these specifications for minimum, standard and maximum data deliverable packages.

7.2 The desired data deliverable package will be selected at the time of procuring the analytical services. All price quotations must include providing OHM with the requested deliverable package.

7.3 All data packages received must meet the requested requirements as specified in the Data Deliverables Package Requirements.

8.0 ATTACHMENTS

8.1 Data Deliverables Package Requirements Table

Data Deliverables Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
Metals	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OHM Sample Numbers, Lab IDs, and analytical QC batches		X	X	X
	Chain of Custody Form, Cooler Receipt form		X	X	X
	Data Summary for Each Sample (See Note 1)	I III	X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)	VII III	X	X	X
	Matrix Spike (MS) Report (including concentration spiked, percent recovered, percent recovery acceptance limits)	V (PART 1) III	X	X	X
	Post digestion Spike Recovery for ICP	V (PART 2) III	X	X	X
	Duplicate Sample Report		X	X	X
	Blank Results	III III	X	X	X
	Initial Calibration Data	III III		X	X
	Continuing Calibration Data	II (PART I) III		X	X
	ICP Interference Check Sample Report	II (PART I) III		X	X
	Standard Addition Results	IV III		X	X
	ICP Serial Dilution Results	VIII III			X
	Copies of Preparation Logs	IX III			X
	Copies of Analysis Run Logs	XIII III		X	X
	Copies of Standard Preparation Logs	XIV III			X
	Raw Data and Instrument Printouts				X
	Percent Moisture		X	X	X
	pH				X (Note 2)

Notes
1) Must include: OHM sample ID, Lab ID, date/time sampled, date received, extracted/analyzed, Practical Quantitation Limit, Method Detection Limit, Dilution Factor, comments, approval signature/date
2) For water samples only

Data Deliverables Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
Organics by GC or HPLC	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OHM Sample Numbers, Lab IDs, and analytical QC batches	IV	X	X	X
	Chain of Custody Form, Cooler Receipt form		X	X	X
	Data Summary for each blank and sample (See Note 1)	I	X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	II	X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits)	III	X	X	X
	Initial Calibration Data for each column (indicate which column was used for quantitation)	VI		X	X
	Continuing Calibration Data (indicate which column was used for quantitation)	VII		X	X
	Chromatograms for each sample (and reruns), confirmation runs, blank, spike, duplicate, and standards			X (Note 4)	X
	Raw Quantitation Report (area vs. retention time)				X
	Copies of Sample Preparation Bench Sheets			X	X
	Copies of Standard Preparation Logs				X
	Copies of Run Logs	VIII			X
	Percent Moisture		X	X	X

Notes
1) Must include OHM sample ID, Lab ID, date/time sampled, date received, extracted/analyzed, Practical Quantitation Limit, Method Detection Limit, Dilution Factor, comments, approval signature/date
4) For petroleum fuels analyses chromatograms for samples with positive results only

Data Deliverables Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
Inorganic Chemistry (Note 2)	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OHM sample numbers, Lab IDs, and analytical QC batches		X	X	X
	Chain of Custody Form, Cooler Receipt form		X	X	X
	Data Summary for each blank and sample (See Note 1)		X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	Duplicate Sample Report		X	X	X
	Calibration Reports Initial and Continuing			X	X
	Copies of Sample Preparation logs				X
	Raw Data and Instrument Printouts				X
	Percent Moisture		X	X	X

Notes:
1) Must include: OHM sample ID, Lab ID, date/time sampled, date received, extracted/analyzed, Practical Quantitation Limit, Method Detection Limit, Dilution Factor, comments, approval signature/date
2) Deliverables depend on method's QC

Data Deliverables Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
Organics by GC/MS	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OHM sample numbers, Lab ID's, and analytical QC batches	IV		X	X
	Chain of Custody Form, Cooler Receipt Form		X	X	X
	Data Summary for each blank and sample (See Note 1)	I	X	X	X
	Tentatively Identified Compounds (TICs) for each sample (ten peaks)	I, TIC		X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	II	X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits)	III	X	X	X
	Instrument Performance Check (Tuning) Report	V		X	X
	Initial Calibration Data (including acceptance limits)	VI		X	X
	Continuing Calibration Data (including acceptance limits)	VII		X	X
	Internal Standard Areas and Retention Times Reports (including acceptance limits and out of control flags)	VIII		X	X
	Reconstructed Ion Chromatogram for each sample and rerun, blank, spike, duplicate, and standard				X
	Raw Quantitation Report				X
	Raw and background subtracted mass spectra for each target analyte found				X
	Mass spectra of TICs with library spectra of 5 best fit matches				X
	Copies of Sample Preparation Bench Sheets			X	X
	Copies of Standard Preparation Logs				X
	Copies of Run Logs				X
	Percent Moisture		X	X	X
	pH				X (Note 3)

OHM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD

Document # QP-617	Title Split Spoon Sampler

APPROVAL

Name	Title	Signature	Date
Willis Moody	Super. QA/QC	[signature]	12/2/93
G. J. Herzig	Mngr. Field Tech.	[signature]	12/1/93
Terry Sole	Dir. Tech. Svcs.	[signature]	12/1/93
Daniel Buettin	VP - Midwest Rgn.	[signature]	1/4/94

REVISION RECORD

Ltr.	Date	Change Description	Initials						
A		issue	-	-	-	-	-	-	-
B									
C									
D									
E									
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OHM Corporation

STANDARD OPERATING PROCEDURE

Title: Split Spoon Sampler Document #: QP-617

1.0 PURPOSE

To provide general information and procedure for the split spoon sampler.

2.0 APPLICABILITY

The manual split spoon sampler is used when taking subsurface samples from 0 to 10 feet. The sample compartment of the split spoon may be from 12 to 24 inches long. Split spoon samplers are available in carbon steel and stainless steel. However, stainless steel split spoon samplers are the most commonly used by OHM. Note: Carbon steel sampling devices are not acceptable according to EPA protocols due to the amount of contaminants that can leach under normal operating conditions.

3.0 RELATED DOCUMENTS

OHM Field Sampling Manual

4.0 GENERAL INFORMATION

4.1 Guidelines for driving split spoon

1.0 One sampling technician uses the sledgehammer. The other holds the drive rod steady. Samplers should orient themselves perpendicular to each other.

2.0 First, wash the split spoon with Alconox and tap water. It is important to remove all soil and visible contamination.

3.0 Rinse with deionized or distilled water.

4.0 Recommended rinsing regimes:

a) Metals and Cyanide - Ten percent nitric or hydrochloric acid, then rinse with deionized or distilled water.

b) Volatile organics - Isopropanol rinse followed by a final deionized/ distilled water rinse. Check with the Project Chemist. Any additional rinse with a site specific solvent may be required.

c) Semi or non-volatile organics - Same as above except use hexane in place of isopropyl alcohol.

4.5 Guidelines for removing the sample from the spoon

1.0 Use clean sample gloves and tongue depressor.

2.0 Discard the top and bottom 1/2 inch of sample.

3.0 A 1-quart or 8-ounce jar with a Teflon liner is used. However, use 40-ml VOA vials with Teflon lined septa for volatile organics.

4.0 To split a sample, use a clean knife or sharp, clean spatula to cut the core down its length. Then use a tongue depressor to transfer each half into separate jars.

5.0 Never drive the spoon 12 inches to get two 6-inch samples. This may cross contaminate the lower 6-inch sample.

6.0 If there are still questions about this procedure, contact the Project Chemist or Technical Services in Findlay.

3.0 Attach assembled sampler to drive rod by screwing male end of drive rod into drive end of sampler.

4.0 Place the split spoon sampler on the desired sample point.

5.0 Mark 6-inch increments on the drive rod using a marking crayon.

6.0 Raise the sledge hammer and allow it to fall onto the drive head of the split spoon sampler.

7.0 After sampler has been driven the appropriate depth, retrieve the sampler by placing a rod through the drive head and pulling upwards on it.

8.0 Remove ends from split barrel using pipe wrenches if necessary.

9.0 Open split barrel by firmly tapping sampler on hard surface.

10.0 Record length of retrieved sample.

11.0 Discard the top and bottom one inch of material.

12.0 Choose a representative section or sections from the remainder of recovered sample.

13.0 Using sample gloves, place sample in the appropriate sample container.

14.0 After each use, the split spoon must be decontaminated following the proper procedure.

7.2 Procedure for utilizing a drill rig to collect split-spoon samples.

1.0 After the boring has been advanced to the desired depth, remove the center rod and pilot bit. Place a clean split-spoon into the HSA.

2.0 Loosen the retaining bolt on the drive cap. Raise the head assembly to the top of the stroke and slide the assembly to the right.

13.0 Hoist the center rod up out of the HSA and remove the split-spoon sampler from the center rods.

14.0 Remove the sampler from the center rod and place the center rod on the ground next to the hammer.

15.0 Remove ends from the split-spoon barrel using pipe wrenches if necessary.

16.0 Open split-spoon barrel by firmly tapping sampler on hard surface.

17.0 Record length of retrieved sample.

18.0 Discard the top and bottom one inch of retrieved soil material.

19.0 Choose a representative section or sections from the remainder of sample recovered.

20.0 Using sample gloves, place sample in the appropriate sample container.

21.0 After each use the split-spoon must be decontaminated.

8.0 EQUIPMENT

- Split barrel sampler (split spoon)
- Basket screens for sampler
- Pipe Wrenches, 12" or larger
- Tongue depressors, wooden
- Pipe vise, 3" or larger
- Sledge Hammer, 5 lb or larger
- Hand auger

OHM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD

Document # QP-618	Title BAILERS

APPROVAL

Name	Title	Signature	Date
Willis Moody	Super. QA/QC	Willis Moody	17DEC93
G. J. Herzig	Mngr. Field Tech.	G. J. Herzig	12/17/93
Terry Sole	Dir. Tech. Svcs.	Terry Sole	1/4/94
Daniel Buettin	VP - Midwest Rgn.	Daniel Buettin	1/4/94

REVISION RECORD

Ltr.	Date	Change Description	Initials						
A		issue	-	-	-	-	-	-	-
B									
C									
D									
E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									

OHM Corporation

STANDARD OPERATING PROCEDURE

Title: Bailers   Document #: QP-618

1.0 PURPOSE

To provide general information and procedures for the bailer sampling device.

2.0 APPLICABILITY

The bailer is designed for obtaining liquid samples. The bailer can be constructed of PVC, Teflon, stainless steel or a combination of these materials. Disposable bailers intended for one time use only are usually made from polyethylene plastic or Teflon.

3.0 RELATED DOCUMENTS

OHM Field Sampling Manual

4.0 GENERAL INFORMATION

The bailer is one of the oldest and simplest methods available. It consists of a container attached to a cable which is lowered into a well to retrieve a sample. Bailers can be of various designs. The simplest is a weighted bottle or basally capped length of pipe which fills from the top as it is lowered into the well. Top filling bailers are acceptable for well purging but not for sampling. More sophisticated bailers have a check valve located at the base which allows water to enter from the bottom as it is lowered into the well. When the bailer is lifted, the check valve closes, allowing water in the bailer to be brought to the surface. More sophisticated bailers are available that remain open at both ends while lowered into the well, but can be sealed at both top and bottom by activating a triggering mechanism from the

7.0 PROCEDURE

7.1 Assemble the decontaminated bailer (if necessary).

7.2 Securely attach sample string to the hole in the top of the bailer.

7.3 Slowly lower the bailer into the liquid to be sampled. Care should be taken not to drop the bailer into the structure being sampled.

7.4 Allow the bailer to fill with the liquid being sampled. Usually, a gurgling sound will be apparent when the bailer is filling.

7.5 When the bailer is full, remove it from the structure being sampled by pulling the string.

7.6 Position the hole on the bottom of the bailer over the appropriate sample container and push up on the Teflon ball to release the material. Alternatively the sample material can be poured from the top of the bailer into a sample container if the bailer design is an open top type.

7.7 After each use, the bailer must be decontaminated before using it again at a different sampling point. Check with the Project Chemist or the Site Supervisor for information on the correct decontamination procedures to use for the site where sampling was done.

8.0 EQUIPMENT

- Bailer

- Sample string or Nylon monofilament line

- Appropriate decontamination supplies

9.0 ATTACHMENTS

Figure 1.0 Teflon Bailer

APPENDIX B

ENVIRONMENTAL PROTECTION PLAN

ENVIRONMENTAL PROTECTION PLAN
FOR
REMEDIAL ACTION
OPERABLE UNIT 02, SOIL VAPOR EXTRACTION SYSTEM
MCAS CHERRY POINT, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
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Naval Facilities Engineering Command
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Program Manager

September 1997
Delivery Order 0080
OHM Project No. 17488

OHM Remediation Services Corp.

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1.0 INTRODUCTION

This plan contains pertinent information regarding potential environmental problems that could occur during site remedial activities.

1.1 PURPOSE

OHM Remediation Services Corp. (OHM), a subsidiary of OHM Corporation, is pleased to submit this Environmental Protection Plan (EPP) for the remediation of operable unit 02, soil vapor extraction system at the MCAS Cherry Point, North Carolina. The site location is shown in Figure 1 of the Work Plan. The activities described herein are to be conducted as part of the tasks required by the Department of the Navy under Contract No. D62470-93-D-3032. The purpose of this plan is to present information needed to minimize the hazards to human health and the environment from fires, explosions, spills, releases of organic vapors, or any unplanned or sudden release of constituents of concern from the Marine Corps Air Station.

This plan fulfills the requirements set forth in Basis of Design Report VOC Soil Hot Spot Remedial Design, April 1997 developed by Brown and Root Environmental, as well as meeting requirements outlined in the following documents:

- Code of Federal Regulations (CFR)
- 40 CFR 300: National Oil and Hazardous Substances Pollution Contingency Plan

- Corps of Engineers (COE)
- COE EP-1110-1-8: 1988 Construction equipment Ownership and Operating Expense Schedule
- COE EM 385-1-1: 1992 Safety and Health Requirements Manual

- National Fire Protection Association (NFPA)
- NFPA 241: (1989) Safeguarding Construction, Alteration, and

- Demolition Operations

This plan is intended for use during the construction stage of the remediation at the site. This plan establishes guidelines which must be followed during activities at the site and must be used in conjunction with the other project plans and documents.

1.2 PROJECT BACKGROUND AND SCOPE OF WORK

Project Background

MCAS Cherry Point is a military installation located in southeastern Craven County, North Carolina, just north of the town of Havelock, North Carolina. The station covers approximately 11,485 acres on a peninsular north of Core and Bogue Sounds and south of the Neuse River.

OU2 is located in the west/central portion of the Air Station. OU2 is bounded by the Sewage Treatment Plant (STP) to the north, Roosevelt Boulevard to the east, a residential area to the south, and Slocum Creek to the west. OU2 consists primarily of the Site 10 landfill. It also includes the polishing ponds (Site 46) north of the landfill, a former sludge application area (Site 44A formerly Site 45) located in the north-central portion of OU2, and the vehicle maintenance area (Hobby Shop) (Site 76) located southwest of the landfill.

Site 10 - Known as the Old Sanitary Landfill, served as the primary disposal site at the MCAS from 1995 until the early 1980s. The landfill is approximately 40 acres in size. The former sludge impoundment area was closed in the mid-1980s. This area was regulated as a hazardous waste management unit under the MCAS's Part B Permit. Also, included in this site is an area that was formerly utilized for storage of petroleum products.

Site 44A - Known as the Former Sludge Application Area, consists of two areas where sludge from the sewage treatment plant (STP) was applied. This site was regulated as hazardous waste management unit under the MCAS's Part B Permit.

Site 46 - Known as the Polishing Ponds No. 1 and 2, consists of two inactive unlined ponds that served as aeration basins for wastewater from the STP. The ponds are approximately 12 feet deep.

Site 76 - Known as the Vehicle Maintenance Area or Hobby Shop, consists of a building and parking lot where base personnel vehicles are repaired.

Scope of Work

The selected remedy for soil and waste is soil vapor extraction (SVE) and institutional controls. SVE was selected by Brown & Root Environmental as the best available technology to remediate petroleum-based hydrocarbons from soil at this site.

The in-situ treatment will consist of a network of SVE wells. Installation of twenty-two vertical soil vapor extraction wells coupled with fourteen existing wells will be utilized to recover volatile hydrocarbon. The wells will be installed into four fields desyncted as hot spot areas 1 through 4. Hot Spot No. 1 will consist of SVE wells 1 through 9, Hot Spot No. 2 will consists of SVE wells 10 through 18, Hot Spot No. 3 will consist of SVE wells 19 through 22, and Hot Spot No. 4 will consist of SVE wells 23 through 36. The four well fields will be served by a single SVE blower that will pull vacuum on all four fields simultaneously.

1.3 Nature and Extent of Contamination

Soil, groundwater, surface water, sediment and leachate seep samples were collected and analyzed for a variety of parameters. Only soil and waste is being addressed in this EPP; however, for a complete understanding of the nature and extent of contamination an exert from the record of decision prepared by Brown & Root Environmental.

Surface Soil

Until 1995, five soil samples had been collected at this site from depths of less than 2 feet. Three of these samples were analyzed for target compound list (TCL) volatile and semi-volatile organics and target analyte list (TAL) metals. Two of the samples were only analyzed for RCRA List 2 metals. In 1995, thirteen additional surface soil and leachate seep samples were collected and analyzed for the full TCL/TAL, including cyanide.

Only a few volatile organic compounds were detected. These include single detections of 1,2-dichloroethane (20 micrograms per kilogram [ug/kg]), methylene chloride (12 ug/kg), and chloroform (9 ug/kg), the first two of which were found at the same location. Xylenes were detected in seven samples at concentrations of 1 to 11 ug/kg, and toluene was found in three samples at concentrations of 11 to 42 ug/kg.

One surface soil sample contained several polynuclear aromatic hydrocarbons (PAHs) at concentrations ranging from 140 ug/kg for indeno (1,2,3-cd) pyrene to 360 ug/kg for pyrene. This sample also contained the highest concentrations of the DDT isomers (35 to 43 ug/kg). Several other pesticides were also detected in surface soils, including chlordane (1.9 to 27 ug/kg), dieldrin (23 ug/kg), endrin aldehyde (3.0 to 27 ug/kg), and heptachlor (2 ug/kg). The maximum concentrations of pesticides were found in various samples throughout the site. Polychlorinated biphenyls (PCBs) were detected in only two surface soil samples at concentrations ranging from 28 ug/kg (Aroclor-1254) to 630 ug/kg (Aroclor-1260).

Metals of interest in the surface soil samples were cadmium, chromium, manganese, and thallium, which were detected at maximum concentrations of 6.4 mg/kg, 51.2 mg/kg, 211 mg/kg, and 6.7 mg/kg, respectively. No single sample location contained an overwhelming majority of the tested maximums. The maximum values were detected at a number of sample locations.

Subsurface Soil

Past soil sampling programs were based on soil-gas and geophysical surveys, aerial photographs, and knowledge of existing groundwater contamination. When anomalous areas or areas of groundwater contamination were identified, soil borings and test pits were installed to collect subsurface soil samples.

The analytical results for subsurface soil show that volatile organic compounds were not detected frequently, but were detected at notable concentrations in a limited number of samples. In addition, only a limited number of samples were analyzed for semi-volatile organic compounds and pesticides/PCBs. Fuel-type constituents, including benzene, toluene, ethylbenzene, and xylenes (BTEX), were identified in a number of subsurface soil samples. The vast majority of samples analyzed for BTEX did not contain these compounds at detectable levels. The primary detections were scattered throughout the site, with the highest concentrations reported in the areas used for fire training exercises in the southern portion of the landfill. The highest concentrations of BTEX (primarily, toluene, ethylbenzene, and xylenes, with lower concentrations of benzene) ranged from 155,280 to 617,000 ug/kg. The sample with the lower concentration was collected at the water table. All other sample intervals were above the water table.

Other areas with BTEX contamination were in the area of the former sludge impoundments (1,900 to 7,500 ug/kg); one boring south of Turkey Gut (4,830 ug/kg); and in the east-central portion of the site (2,174 to 10,993 ug/kg). All of the samples in these areas were collected from above the water table. The presence of these constituents in soil appears to suggest potential source area(s) for BTEX in groundwater.

Another group of compounds potentially relating to observed groundwater contamination are chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethenes (DCE), vinyl chloride, and 1,1,1-trichloroethane (TCA). While not widespread, their presence also appears to correlate with observed areas of these compounds in the surficial aquifer. There are a few areas with chlorinated solvents in the soil, such as south of Turkey Gut (DCE at 6 to 4,700 ug/kg and vinyl chloride at 490 ug/kg), the area of the former sludge impoundments (PCE at 4,800 ug/kg, TCE at 800 to 880 ug/kg, and TCA at 2,500 ug/kg) and in the east-central portion of the site (PCE at 38 ug/kg). All samples in these areas were collected above the water table.

Other compounds of note in the subsurface soil include several phenols found in the area of the former sludge impoundments. These compounds and the maximum concentrations included phenol (12,00 ug/kg), 2,4-dimethylphenol (4,100 ug/kg), and 4-methylphenol (27,000 ug/kg). All samples in this area were collected above the water table. In addition, several of the more soluble PAHs were detected in the area formerly used for fire-training exercises in the southern portion of the landfill. The highest concentrations were reported for fluorene (20,000 ug/kg), phenanthrene (90,000 ug/kg), naphthalene (39,000 ug/kg), and 2-methylnaphthalene (230,000 ug/kg). The depth interval was at the water table.

Pesticides were not frequently analyzed nor were they frequently detected. Dieldrin was one of the most commonly detected pesticides and was found at a maximum concentration of 53 ug/kg in the former sludge impoundment area. Other pesticides of note were chlordanes (630 ug/kg maximum) and 4,4'-DDD (3.5 ug/kg maximum). The maximum concentrations of these pesticides were detected in the southern portion of the landfill. Many of the maximum concentrations of these and other pesticides were found at depths greater than 10 feet. This may indicate soil mixing or application of pesticides for insect control when various areas were receiving waste material.

Ketones were detected in several samples. Acetone was detected at concentrations up to 5,300 ug/kg (southern portion of landfill), and 2-butanone was detected up to 16,000 ug/kg (east-central portion of site).

A number of metals were detected in the subsurface soil samples. Many metals were detected in 90 percent or more of the samples, with the following metals detected less frequently: antimony (13 percent), mercury (10 percent), beryllium (32 percent), cadmium (20 percent), cobalt (41 percent), copper (60 percent), nickel (41 percent), selenium (33 percent), silver (9 percent), thallium (5 percent), and vanadium (79 percent). Metals that were detected in at least 90 percent of the samples include aluminum, arsenic, barium, calcium, chromium, iron, lead, magnesium, and manganese. Several of the metals, including arsenic, vanadium, and zinc, were detected at concentrations that are not significantly different from the background concentration range. The metals whose maximum detected concentrations exceeded the background results the greatest were antimony, barium, cadmium, copper, lead, manganese, and silver. Metals were not widespread or common contaminants in subsurface oil at Operable Unit 2, although there are a limited number of locations with high concentrations (i.e., hot spots). Copper, lead, and zinc were those metals which were detected frequently at concentrations greater than background and which appeared to be the most widespread.

Groundwater and Surface Water

Surficial Aquifer

The most commonly detected contaminants in the surficial aquifer were monocyclic aromatic fuel constituents (BTEX), halogenated aliphatics (chlorinated solvents and breakdown products such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), vinyl chloride, 1,1,1-

trichloroethane (TCE), dichloroethanes (DCA), and chloroethane), and chlorinated monocyclic aromatics (chlorobenzene and dichlorobenzenes). Several items are of note in discussing the nature and extent of contamination in the surficial aquifer. First, there is widespread contamination of groundwater with organic chemicals. Those listed above are the most prevalent based on past and recent data. Second, the maximum detected concentrations of may compounds have declined over the years. Third, although no distinct plumes are visible based on the most recent sampling event, several areas of overall contamination can be outlined as general areas of concern. These areas of concern are those in which certain contaminants exceed State and/or Federal groundwater or drinking water standards.

Benzene, TCE, and vinyl chloride were the compounds that exceeded the state groundwater quality standards most often. The concentration of benzene over much of OU2 exceeds the state standard of 1 microgram/liter (ug/L). Within this area of general benzene contamination, three areas of solvent contamination were identified. One area is located west (downgradient) of the former sludge impoundment area and extends to the south side of Turkey Gut. Another area is centered on the eastern edge of the landfill, and a third area is located in the southwest portion of OU2. This area may be associated with the fire training areas and potential use of solvents there or in the adjacent vehicle-maintenance area (Site 76).

Several areas have chlorobenzene concentrations exceeding the state standard of 50 ug/L. These areas are as follows: (1) coincident with the solvent contamination area south of Turkey Gut; (2) an area in the upstream area of Turkey Gut; and (3) the areas surrounding sample OU2HP1, which is located southwest of Turkey Gut.

Metals are not significant groundwater contaminants at this site. During the most recent sampling event, only two toxic metals (arsenic and cadmium) were found that exceeded state standards (50 and 5 ug/L, respectively). Iron and manganese concentrations exceeded the state standards (300 and 50 ug/l, respectively) in most of the wells during the most recent sampling event. The standards for iron and manganese are based on aesthetics (e.g., taste, odor, staining of plumbing) rather than toxicity.

There is no significant difference in the analytical results for wells screened in the upper and lower portions of the surficial aquifer. This indicates there is little potential for nonaqueous-phase liquids at this site.

Yorktown Aquifer

The analytical results for the Yorktown aquifer indicate that metals are not significant contaminants except for iron and manganese. Iron exceeded the state groundwater standard in most wells, and manganese exceeded the standard in more than 50 percent of the wells. Organic compounds were detected in low concentrations during the most recent (1994) sampling round. These include chloroform (1 and 2 ug/L), methylene chloride (3 ug/l), and bis(92-ethylhexyl) phthalate (25 ug/l), which are common laboratory contaminants. However, none of these compounds were found in QA/QC blanks at levels that would affect the data.

The concentrations of all metals found in the Yorktown aquifer during the most recent sampling event were below drinking water standards or State groundwater standards, except for iron and manganese. The standards for iron and manganese are based on aesthetic concerns.

Surface Water

The analytical results for samples collected from Turkey Gut and Slocum Creek in 1994 indicate that the suite of compounds detected is similar to the types and classes of compounds detected in onsite groundwater. In Turkey Gut, a sample that was located just upstream of an identifiable leachate seep (in 1985) contained benzene, chlorobenzene, 1,4-dichlorobenzene, 1,1- dichloroethane, chloroethane, cis-1,2-dichloroethene, and vinyl chloride. Most detectors were 1 to 3 ug/L. Chlorobenzene was detected at a concentration of 10 ug/l. chloroform was not detected in the surficial aquifer in samples collected in 1994. Another compound (cis-1,2-dichloroethene) that was consistently found on site was also detected in Slocum Creek. Therefore, it can be assumed that contaminated groundwater is discharging to Slocum Creek. The sample in which cis-1,2- dichloroethene was detected is at the downgradient end of a contaminant plume emanating from the former sludge impoundment.

Pesticides were detected in several surface water samples, although their presence may be related to suspended sediment material in the samples rather than actually dissolving in the surface waters. Pesticides were detected at low concentrations in a number of groundwater samples, although no plume or significant soil source area could be identified that could result in the presence of these pesticides in Turkey Gut or Slocum Creek. The source of these pesticides is most likely the prior or current application of these materials throughout the watershed, followed by runoff.

Manganese was a prevalent groundwater contaminant at concentrations that exceeded state groundwater standards. It is notable that manganese was also found in Turkey Gut at similar concentrations. Manganese was detected in only one Slocum Creek sample.

There is no general pattern or trend in contaminant distribution in either Turkey Gut or Slocum Creek.

Sediment and Seeps

Sediment

Sediment analytical results for 1994 indicate that pesticides and metals are the most frequently detected analytes. A wide variety of pesticides was found in Turkey Gut. In Turkey Gut, the pesticide concentrations were found generally in an upstream sample or in a sample collected from near the mouth of Turkey Gut. Many of the identified compounds were detected in surface soil samples. Some, but not all, of the pesticides detected in Slocum Creek were also detected in surface soil samples. It is not known whether the site is contributing to the presence of pesticides or whether such presence is a result of current or past use of pesticides at the Air Station.

The concentrations of metals in sediment in Slocum Creek and Turkey Gut do not appear to indicate the presence of a major onsite source area. Many of the metals are found at concentrations within approximately two times the background soil concentrations. Although this comparison is not totally valid (i.e., soils are not the same as sediments), the fact still has credence in identifying whether onsite soils may be contributing to the observed sediment contamination. The maximum concentrations of individual metals were found at all 1994 Turkey Gut sample locations. All maximum concentrations in Slocum Creek were detected in the most downstream location. No upgradient or upslope areas could be identified as potential sources of these metals in Slocum Creek.

Leachate Seeps

The earliest leachate seep water and sediment samples were collected and analyzed in 1985 and 1987. Additional leachate seep samples were collected in 1995. Samples were collected of surface water (if present) or sediment (if no surface water present) from near the four locations sampled between 1985 and 1987, along with a water sample from a new location. One of the water samples was from a leachate seep/spring at the toe of the Site 10 landfill, and two were from areas of ponded surface water.

Based on the 1995 results, the actual leachate seep contained several volatile organic compounds (2 ug/L of benzene, 5 ug/L of chloroethane, and 3 ug/L of vinyl chloride) that were also detected in he surficial aquifer, although at higher concentrations. One of the areas of ponded water contained the only other detections of organic chemicals (xylenes at 2 ug/L and several pesticides ranging from 0.625 ug/L to 0.17 ug/L).

Based on the 1995 results, the leachate seep contained the highest concentrations of many metals (except thallium). In several cases, the concentrations of metals in this sample exceeded the maximum detections in the surficial aquifer. These metals included antimony, cadmium, chromium, copper, lead, nickel, selenium, and zinc. For all other metals, the concentrations in groundwater exceed the leachate water concentrations. Many of the metals (cadmium, iron, and manganese) were present at concentrations that exceeded State groundwater standards and/or Federal drinking water standards.

The sediment samples collected in 1995 from previously identified (but visibly dry at the time of sampling) leachate seep locations were similar in concentration to surface soil samples. Only a few organic compounds were detected (monocyclic aromatics, trihalomethanes, phthalate esters, and pesticides) at low concentrations. The organic compounds detected at the highest concentrations were 4,4'-DDE (69 ug/kg), di-n-octylphthalate (67 ug/kg), and toluene (42 ug/kg). The concentrations of all other organics ranged from 7.6 ug/kg (endosulfan I) to 25 ug/kg (gamma- chlordane).

The concentrations of metals in these two leachate seep sediment samples were also similar to those reported for surface soil. However, some metals were found at higher concentrations whereas others were found at lower concentrations. Some of the more notable metals detections include arsenic (17.1 mg/kg), lead (76.5 mg/kg), and zinc (80.8 mg/kg).

Polishing Pond Sediment

Eight sediment and soil samples were collected from the polishing ponds in 1994. The uppermost sample was collected from the pond sediment, and the deeper sample was collected from the underlying natural soil material. The data indicate that the sediments in the ponds contain a number of organic chemicals, whereas the underlying soils are fairly free of organic contamination. For example, pond sediment contains ketones, monocyclic aromatics, phthalate esters, PAHs, and pesticides at concentrations ranging from 0.063 ug/kg (gamma-BHC) to 13,000 ug/kg [bis(2- ethylhexyl)phthalate]. The underlying material contains chloroform (4 ug/kg), bis(2- ethylhexyl)phthalate (130 ug/kg), di-n-butylphthalate (255 ug/kg), alphachlordane (0.1 ug/kg), and heptachlor (up to 0.14 ug/kg). In general, the pond sediments contain higher concentrations of metals than the underlying soils.

2.0 ORGANIZATION STRUCTURE FOR IMPLEMENTATION

The following sections describe the personnel and required chain of command that will control and direct EPP activities at the site.

2.1 RESPONSIBLE PARTIES

This section details each responsible party and their respective task(s).

Department of Navy/Marine Corps Air Station, Cherry Point - The Marine Corps Air Station, Cherry Point is the Owner of the site and the responsible party for the site removal activities. The Navy has contracted Ohm to perform the remediation activities. As part of the contractual arrangements with OHM, the Navy's technical representative will delegate the responsibility for the implementation of this EPP to OHM. Throughout the duration of the site remediation activities, OHM will notify the Navy and MCAS of any EPP incident as soon as possible.

OHM is responsible for implementing EPP procedures and is responsible for all information contained in this EPP. Figure 2.1 depicts OHM's organizational structure for EPP and emergency situations.

2.2 EMERGENCY SERVICES

A summary of local and state emergency service agencies with phone numbers is provided in Table 2.1. Individual emergency agencies and responsibilities are as follows:

Police - The Marine Corps Air Station Base police will provide police support for blocking traffic, directing traffic, and other related duties during EPP situations. Unlawful entry into the site will also be reported to the Marie Corps Air Station Base Police.

Fire Department - All EPP situations requiring fire department personnel and equipment will be reported to the Marine Corps Air Station Base Fire Department.

2.3 COORDINATION RESPONSIBILITIES

All EPP provisions will be implemented by means of OHM's organizational structure shown on Figure 2.1. OHM is responsible for coordination, training, drills, notification, and other aspects of this EPP.

2.3.1 Project Manager

The Project Manager is ultimately responsible for completion of the project in accordance with the plans. He delegates the responsibility for the implementation, maintenance, and compliance of the project activities with the EPP and the OHM Site Health and Safety Plan (SHSP) to the site health and safety officer (SSO).

2.3.2 Site Health and Safety Officer

The SSO will be responsible for all EPP and health and safety activities for air monitoring activities, overseeing the decontamination of equipment and materials leaving the contaminated area and for providing and enforcing the use of personal protective equipment and clothing, decontamination procedures and emergency response procedures. A Health and Safety professional will be responsible for training of on-site personnel. The SSO has the authority to stop any operation that threatens the health and/or safety of the team or surrounding populace. The daily EPP inspections and health and safety activities may be conducted by the SSO or the on-site superintendent.

2.3.3 On-Site superintendent

The on-site superintendent is responsible for field implementation of the EPP procedures and the health and safety program when the SSO is not present. This responsibility includes advising site workers of the specific health and safety requirements and consulting with the SSO regarding appropriate changes to the EPP and health and safety plan.

2.3.4 Emergency Coordinator (EC)

The emergency coordinator will implement and coordinate all EPP procedures during spills and releases. During an emergency, the EC will activate alarm systems, notify emergency response agencies, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation. The EC will also be responsible for follow-up activities after the incident such as treating, storing, or disposing of residues and impacted soil, decontamination and maintenance of emergency equipment, and submission of any reports. The EC is also responsible for personnel training and evacuation drills. The on-site during all remediation operations. If neither the on-site superintendent nor the SSO are on-site, then the responsibility of the EC will be reassigned to a qualified individual and so noted in the Health and Safety Meeting Notes prior to any work commencing any given day.

2.3.5 Site Personnel

All site personnel will be responsible for working in a safe and healthy manner. They will be required to comply with all applicable local, State, and Federal rules and regulations.

Table 2.1
LOCAL AND STATE EMERGENCY SERVICE AGENCIES AND PHONE NUMBERS

Local Agencies - All Services	
City of Havelock	
Police Department	911
Sheriff	911
Fire Department	911
New Bern Ambulance	911
Hospital	
Carteret General Hospital 3500 Arendell St. Morehead City	(919) 247-1616
On-Base Facilities	
Health Clinic	(919) 466-3960 or 4241
Emergency Medical	466-4419 or 911
Emergency Fire	466-3333 or 911
Fire Chief - Cecil Moore	466-3615
Police	(919) 466-3615
Regional Poison Control Center	800-672-1697
State Agencies	
State Highway Patrol	800-441-6127
Division of Emergency Management	800-858-0368
Federal Agencies	
EPA Region Branch Response Center	(404_347-3931
National Response Center	800-424-8802
Agency for Toxic Substance and Disease Registry	(404) 639-0615 (24 hours)
Navy ROICC/NTR - Ens Jeff Divenney	(919) 466-4736
U.S. Coast Guard	(804) 484-8192
National Response Center	800-424-8802
OHM Project Personnel	
Steven Bivone, Project Manager	(770) 453-7637
Mark Wilson, CIH, Health and Safety Officer	(770) 734-8086
OHM Corporation (24 hours)	800-537-9540

Note: Additional phone numbers are provided in Section 2.0 of the SHSP.

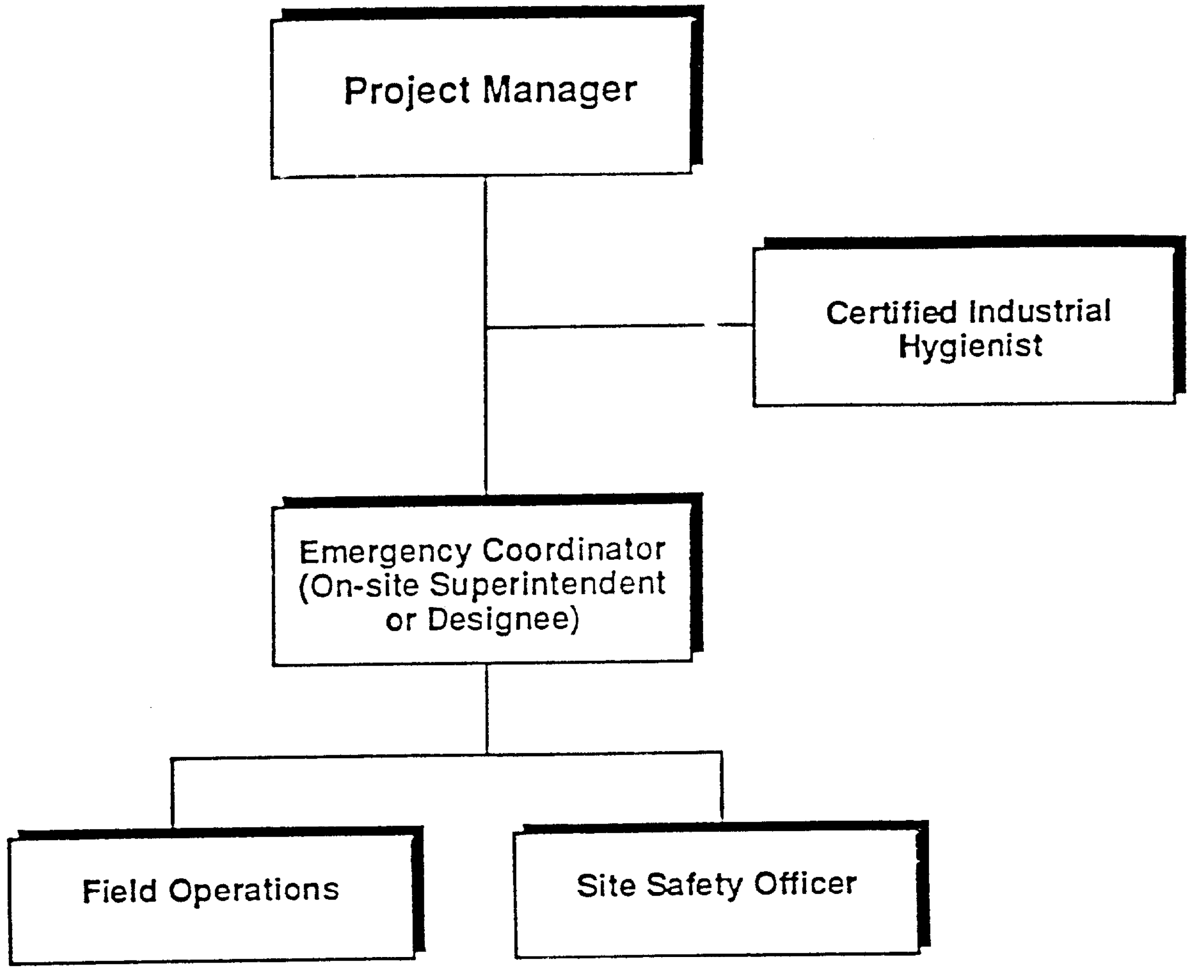

Figure 2.1

Organizational Structure for EPP and Emergency Situations

3.0 MATERIALS INVENTORY AND COMPATIBILITY

The following section contains information regarding the materials that may be involved in a spill or release. Table 3.1 lists quantities of the materials present on site by their type.

•Table 3.1
•MATERIAL INVENTORY

Material	• Unit	• Location
Diesel fuel	• 1 gallon	• Fuel storage area
Gasoline	• 1 gallon	• Fuel storage area
Oil	• 1 quart	• Fuel storage area
Acids	• TBD (2)	• Decontamination trailer
Cement	• 40-pound bags	• Blower Pad area

Notes:
1) Amount and storage requirements will be determined based on need and laydown space availability.
2) Quantity and type of sample preservatives will be identified by need based on the Contractor's Sampling and Analysis Plan.

3.1 ON-SITE MATERIALS

The constituents of concern for the remedial action include benzene, toluene, vinyl chloride, ethylbenzene, xylenes, MTBE, TPH, gasoline, and diesel. These contaminants are present ground water and soils at the site. On-site materials consist of soil and construction debris.

3.2 ORGANIC VAPOR

Organic vapor releases may occur during remedial activities. Organic vapor concentrations in the air during excavation, drilling activities, system startup will be monitored using air monitoring equipment such as a photoionization detector (PID). Air monitoring requirements are described in Section 7.5.

Physical boundaries will be established to assist in the prevention of the uncontrolled release of dust or debris.

3.3 FUEL AND FLAMMABLE LIQUIDS

To complete the project, OHM will construct an on-site fuel depot that will contain fuels and oils for construction vehicles. The types of materials that may be stored at the fuel depot are as follows:

- Diesel Fuel
- Gasoline
- Motor and Transmission oils
- Greases
- Used Oil

3.4 OTHER MATERIALS OF CONCERN

Other materials necessary to complete the project that have the potential for spills and releases are listed below. The exact quantity and type of these materials will be determined during remedial activities:

- Acids for sample preparation
- Agricultural Lime
- Fertilizer
- Acetone
- Pipe Sealents
- Adhesives

Agricultural lime and fertilizer will be used as construction materials during the restoration of grassy areas along the piping routes. Acetone, pipe sealants, and adhesives will be utilized in the cleaning and connection of pipe joints.

3.5 MATERIAL COMPATIBILITY

The materials mentioned in Section 3.1 to 3.4 are not anticipated to be mixed or combined during site operations. All of the compatibility data that exist for each material are noted on each MSDS provided in the site-specific health and safety plan.

4.0 EMERGENCY AND DECONTAMINATION EQUIPMENT

This section discusses the equipment necessary for emergencies, spill responses, and decontamination of site equipment.

4.1 EMERGENCY EQUIPMENT

Small-and large-scale equipment that will be used for emergency and activities are described as follows:

- Small-scale Emergency Equipment
- Dry-chemical, ABC-rated fire extinguishers
- Spill control equipment
- Absorbent materials
- Decontamination equipment
- Breathing respirators
- Radio and telephone equipment
- Wind socks
- Various hand tools

This equipment will be made accessible to all on-site workers. Locations of equipment will be posted at OHM's trailer.

- Large-Scale Equipment
- Front-end loader
- Backhoe
- Bulldozer
- Excavator

Large-scale emergency equipment will include the equipment used in the ongoing construction activities. Other emergency equipment will be available from the local fire department and other agency's equipment if needed. Some of the equipment listed may be present on-site for use under different delivery orders; however, in the case of emergency all OHM equipment and rental equipment may be utilized by direction from the site superintendent, SSO or EC.

4.2 SPILL RESPONSE EQUIPMENT

OHM will provide adequate spill response equipment and materials. Spill response equipment will include absorbent materials, sand, chemical neutralizers, and other spill containment devices necessary to prevent spill migration. Other equipment will include construction equipment used in ongoing construction activities.

All equipment will be tested and maintained as necessary to assure its proper operation in time of emergency. After an emergency, all equipment will be decontaminated, cleaned, and fit for its intended use before normal operations resume.

4.3 DECONTAMINATION EQUIPMENT

Equipment necessary for decontamination activities will be provided, installed, and verified in working order prior to any site operations. Equipment for the decontamination area includes the following items:

- Temporary Decontamination Pad and Sump (as needed for drilling activities)
- Clean Water Supply
- Detergent Solution
- Brushes
- Waste Containers

Permanent storage pad and sump have been constructed in the "OHM lay down" area on base for use under all delivery orders. Depending on the nature of the work and the location of the work temporary facilities may be required. The decision of the need for temporary facilities will be discussed and locations/type will be determined at the pre-construction meeting.

5.0 SITE EVACUATION PLAN

The following sections provide details regarding the evacuation of the site in the case of an emergency.

5.1 SAFE DISTANCES AND PLACES OF REFUGE

The emergency coordinator for all activities will be the SSO. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies which could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and to await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 2.1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Power loss
- Medical emergency
- Hazardous weather

In general evacuation will be made to the crew trailers, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

5.2 EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

5.2.1 Evacuation Signals and Routes

Two-way radio communication and air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. Each crew supervisor will have a two-way radio. A base station will be installed in the OHM office trailer to monitor for emergencies. Total site evacuation will be initiated only by the emergency coordinator; however, in his absence, decision to preserve the health and safety of employees will take precedence. Evacuation routes will be posted in each outside work area. Periodic drills will be conducted to familiarize each employee with the proper routes and procedures.

5.2.2 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site
- will cease in order to allow safe exit of personnel and movement of emergency equipment.
- Shut off all machinery if safe to do so.
- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the emergency coordinator.

- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader should try to keep the group together. Immediately upon exit the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the emergency coordinator.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- A final tally of persons will be made by the emergency coordinator or designee. No attempt to find persons not accounted for will involve endangering lives of OHM or other employees by re-entry into emergency areas.
- In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the on-site superintendent. The security guard will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.
- Personnel will be assigned by the emergency coordinator to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance is given by the emergency coordinator. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

6.0 SPILL PREVENTION AND RESPONSE

This section outlines areas of potential spill and the procedures necessary to prevent them. The Air Station Order 11010.1E is included in Appendix A and should be reviewed by all personnel in conjunction with other procedures Set forth herein. A copy of the draft Air Station Order 5090.7 is also included in Appendix B. OHM will elect to follow the more stringent of these two orders.

6.1 POTENTIAL SPILL SOURCES AND PREVENTION PRACTICES

The following section details OHM's procedures for implementing this portion of the EPP. Potential activities include containment, collection, and material disposal or reuse.

6.1.1 Fuel Storage

Vehicle fuels and oils will be stored in fuel depot areas in approved storage containers. The fuel tanks will be anchored to the ground, stabilized on skids, or placed on saddles to prevent over turning and rolling. Containers will be placed outside of the maximum turning radius of all vehicles, as well as turnaround or unloading zones. Secondary containment is required for all fuel containers larger than 5-gallons. Secondary containment will be 110% of the aggregate storage volume. All tanks will be placarded with the National Fire Safe system for hazardous material classification and the tanks will be properly electrically grounded.

6.1.2 Hauling Activities

Any spillage that occurs during any hauling and transport activities will be contained within the containers at OHM lay down area until appropriate characterization of waste stream and disposal is identified. All vehicles prior to leaving the site shall be inspected and routed to the decontamination area for either dry and/or wet decontamination of exterior and/or wheels.

6.2 EXTERNAL FACTORS

The following describes actions to be taken to alleviate effects to public health and safety or the environment from factors external to the site.

6.2.1 Power Outages

Power will be from utility service drops and/or contractor supplied generators. OHM will have access to a backup generator in case of failure of the primary service drops and/or generator(s) where such failure may impact the public health or safety of the environment.

6.2.2 Severe Weather

short-duration, high-intensity rain showers may create unexpected erosion and drainage problems such as slope and containment berm erosion. Immediately after such events, all containment devices will be closely inspected for structural and practical integrity. Also, spillage or leakage will be immediately corrected. Repair to these containment devices will be made as soon as possible or at least before construction continues. All excavated materials should be covered and secured as when possible. See Erosion Control Plan for a more detailed discussion.

6.2.3 Hurricanes

When a hurricane warning is issued equipment should be removed to a safe location as time provides. Evacuation of personnel should follow the designated inland route and abide with directions given by the local emergency management agency.

6.3 PROTECTION OF NATURAL RESOURCES

Protection of natural resources will be in accordance with the Erosion Control Plan.

In general, OHM will limit the extent of clearing operations to the areas required for access to hot spot areas and support facilities. All reasonable attempts will be made to keep the construction areas to a minimum; similarly, the size of staging and support zones will be kept to a minimum. Where possible, piping is to be located along the roadway. Mounding of soil over the piping is preferred to trenching.

All reasonable attempts will be made to minimize landscape defacement. Wetlands areas will be avoided when possible. This will include the trimming of trees and brush instead of removal, wherever possible. It is anticipated that some of the trees along the piping route will be removed. Operation of equipment will be limited to the confines of the construction areas to minimize the potential for residual damage to cap.

It is expected that restoration of the grassy areas along the piping route will be needed. Like flora and grasses will be used.

6.4 DUST CONTROL AND EROSION PROTECTION

Water trucks with sprinkling attachments will be used, as necessary, to control dust in the excavation areas and during placement of fill materials in the trench area and treatment plant excavation area. The water source for the trucks will be approved by the ROICC prior to utilization. Water will be applied in sufficient quantity to prevent creation of dust, but excessive watering that may result in a muddy condition that may be transferred to the haul roads will not be permitted. Determination of the need for dust control will be the responsibility of the OHM site superintendent as dictated by changes in site conditions on a continuing basis.

7.0 PREVENTATIVE ACTIONS

This section discusses the daily inspections that will be performed to ensure a safe working environment for both site and base personnel.

7.1 INSPECTION

Daily inspections of site areas will be performed by OHM's site-superintendent to ensure that procedures for proper storage, handling, and transport of materials are being followed. Inspection and monitoring methods will be through visual observation. Monitoring equipment as described in Section 7.5 will be used when necessary. Such areas include the following:

- Excavation areas
- Fuel depots - various fuels and oils
- Erosion control measures

Other areas and items that will be monitored and noted in the site logbook:

- Evidence of spilled materials along drainage ditches
- Effectiveness of housekeeping practices
- Various shipping and storage containers used throughout the site
- Disposal staging areas
- Proper placards and labeling of truck and tank contents.

7.2 EQUIPMENT MAINTENANCE

All construction equipment will be properly maintained to ensure safe operation. Equipment (especially trucks) will be properly maintained to minimize spillage or leakage which may occur during on-site transport operations. Further preventive maintenance on trucks is described in Section 7.4.2.

7.3 CALIBRATION OF MONITORING EQUIPMENT

It is important that all environmental monitoring equipment be calibrated so that accurate readings of potential spilled or leaked materials may be detected upon inspection. Calibration frequency and procedures will be followed as per the manufacturer's recommendations. OHM will retain calibration records on site.

7.4 HOUSEKEEP PROGRAM

OHM's housekeeping program includes many items such as: neat and orderly storage of materials, proper truck and tank placards, prompt removal of spillage, regular refuse pickup and disposal, maintenance of roads and surfaces, and provisions for the storage of material and equipment to keep them from protruding into walkways, or roads.

Orange construction fencing and straw bales and lighted barricades may be utilized to prevent foot traffic and vehicle traffic from inadvertently slipping or backing into open trenches. No road crossings will be left opened over night.

7.4.1 Small Spillage

Small spills may include solid materials or liquid materials being mishandled, dumped, leaked, knocked over, etc. Any material spillage will be immediately contained and collected and placed on the pad for later disposal located at OHM's lay down area. Excavation of trenches and treatment pad area will be performed such that exposed source material remains within the limits of excavation or transported to the OHM's soil staging area for characterization and ultimate disposal. All spilled liquids will be contained and collected by absorbent materials and the materials taken to the OHM's staging area for characterization and ultimate disposal. Spilled fuel and impacted soil will be transported to the staging pad for later disposal.

7.4.2 Trucking

All hauling vehicles will be maintained in good operating condition. Tires will be properly inflated and will have adequate tread depth as per the tire manufacturers' recommendations. Trucks will not be overloaded, since overloaded trucks increase the possibility of material spillage. Truck and gates will be inspected to ensure they close and seal properly.

7.4.3. Vehicle Decontamination

Vehicle decontamination will be dry brush as needed when leaving the trenching area. This will reduce the amount of material that falls onto base's streets, which same will be removed as described in the Small Spillage Section 7.4.1.

7.4.4 Worker Training

All employees with the potential of exposure to hazardous substances will be required to attend and complete an Occupational Health and Safety Administration (OSHA) 40-hour Health and Safety Course (Hazardous Waste Operations and Emergency Response) as per 29 CFR 1910-120. Employees having this training will attend an 8-hour OSHA refresher course if the 40-hour class was taken over 1 year before that employee is to be on site.

The site specific training program will involve at lease one hour of instruction per employee. At a minimum, the training program will ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures and emergency equipment systems including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; co .munication and alarm procedures; response to fires and explosions; site evacuation procedures; and, shut-down of operations. In addition, the employee training program will address other aspects of the EPP, such as preventive maintenance, inspection and monitoring, housekeeping practices, etc.

Job specific EPP and health and safety instructions will be reviewed before beginning each new phase of work. Weekly, or more often if conditions require, the SSO or On-Site Superintendent will conduct follow-up training related to the change in operations or any other training deemed necessary by the SSO. OHM will hold daily safety meetings prior to work to discuss the current project site safety considerations.

Site evacuation training will be provided as described in Section 5.0.

7.5 AIR MONITORING REQUIREMENTS

Air monitoring will be performed as required in the SHSP. A PID will be used to provide real-time, semi-quantitative data on total organic vapor concentrations in and around the breathing zone of workers and downwind of site activities. This instrument will be calibrated daily and organic vapor concentration will be monitored during site activities.

The SHSP identifies additional air monitoring instrumentation. It also defines action levels for upgrading employee protection and instituting emergency actions. The air monitoring will determine concentrations of site contaminants within the ambient air and workers' breathing zone. The air monitoring measurements will be compared to OSHA standards which are the basis for defining the site action levels. The SSO will make the decision regarding equipment upgrades and emergency action based on the air quality measurements.

A wind sock will be installed to monitor the wind direction. The wind direction will be noted by the EC and other evacuation leaders so that evacuation procedures place personnel upwind of the situation. The wind sock will be placed in the project trailer area. Ribbons or "mini-socks" maybe employed along the trenching activities and during startup procedures to assist the SSO in gauging wind direction.

8.0 EROSION AND SEDIMENTATION CONTROL

This section discusses general erosion and sedimentation control measures for the project. Details for erosion and sedimentation control can be found in the Erosion Control Plan.

8.1 FEATURES OF PROJECT AREAS

Figures 2 and 3 in the Work Plan depict the selected route for the piping lines and the location of the SVE /AS equipment. The Erosion Control Plan was submitted for review and acceptance by the State of North Carolina under the Operable Unit 01, interim groundwater remedial project. If any notations or directions differ from those contained the Control Plan and this report, then the Erosion Control Plan will govern.

8.2 UPGRADIENT WATERSHED

Piping lines - the existing drainage ditches and swells in the topography along the piping routes will be used to divert upgradient run-on around the construction areas. The diverted water will follow the existing drainage flow pattern where ever possible.

8.3 PROJECT ACTIVITIES

The anticipated project activities that require erosion and sedimentation controls are described in the following sections.

8.3.1 Site Preparation

The SVE System site will be cleared and grubbed and silt curtains placed. These sedimentation devices will be monitored and repaired as necessary until project completion and acceptable germination of grass.

8.3.2 Site Regrading and Revegetation

The final task at the site will involve the regrading and revegetation of the project areas. All silt fence will be removed after vegetation is established. The areas disturbed for any ancillary features will also be seeded after the facilities have been removed.

8.4 TEMPORARY CONTROL MEASURES

The specific use and types of the controls will be described in Erosion Control Plan. All controls will comply with the technical specifications and the drawings presented in that report.

8.4.1 Silt Fence

Silt fence will be utilized as a temporary sedimentation control measure around the construction areas. Silt fence will also be placed as necessary to accommodate site conditions at the direction of the site superintendent and/or ROICC along the piping runs.

8.4.2. Straw Bale Barriers

Straw bales will be used in places where flow over disturbed areas must be minimized while vegetation is established. Locations of the straw bales, if used, will be decided in the field.

8.5 PERMANENT CONTROL MEASURES

This section describes the various permanent erosion and sedimentation controls that will be used during and upon completion of excavation and trenching activities at the site. All controls will comply with any technical specifications presented in the Design Submission and the Erosion Control Plan.

8.5.1 Vegetative Establishment

All access areas will be vegetated upon project completion with a long-term seed mixture. No other permanent control measures are anticipated. Trees destroyed along the pipe line will not be replanted.

These trees will be left in woody area for wildlife habitat.

8.6 MAINTENANCE PROGRAM

Maintenance of the erosion and sedimentation controls during the project will be performed by OHM site superintendent or his designated representative in his absence from the site. All controls will be inspected daily, as well as after each storm event. Any changes to the Erosion Control Plan will be documented in red on a control sheet. A weekly record will be turned into the ROICC showing any and all changes that occurred in the implementation of the Erosion Control Plan. Sediment removed from controls will be collected and bulked with excavation materials for off-site disposal.

Air Station Order 11010.1E

SPILL REPORT MEMORANDUM - SAMPLE FORMAT

The following format should be followed in submitting a spill report:

(UNIT/ACTIVITY)
Marine Corps Air Station
Cherry Point, North Carolina 28533-5000

6280 (Code)
(Date)

From: (Unit/Activity)
To: Natural Resources and Environmental Affairs Officer
Via: (Chain of Command)

Subj: POL AND HM/HW SPILL REPORT

Ref: (a) AirStaO 11010.1

1. Per the reference, the following report of a hazardous substance spill is made:

a. Date: (Date spill occurred) Time: (Time spill occurred)

b. Unit: (Unit responsible for spill)

c. Name/Rank: (Name/rank of person reporting spill)

d. Location: (Location of spill, squadron, building, etc.)

e. Amount/Type: (Amount and type of hazardous substance spilled)

f. Elimination Steps: (Steps used to eliminate spill/fire hazard)

g. Response Supervisor: Name/rank responding Crash/Fire/Rescue

h. Notification (checklist):

(1) Security Department, Fire Division (2241/3333) Yes ____ No ____

(2) FMO (4363) Yes ____ No ____

(3) NREAO (4591 working hours only) Yes ____ No ____

(4) Duty Officer (of unit if after hours) Yes ____ No ____

(5) Naval Hospital Industrial Hygienist (3833/4561) Yes ____ No ____

ENCLOSURE (3)

2. Additional Comments: (Cause of spill, description of damage, etc.) ______

3. Section Leader's Signature: ______

4. Supervisor's Signature: ______

ENCLOSURE (3)

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION
CHERRY POINT, NORTH CAROLINA 28533-5001

AirStaO 11010.1E
LCM
23 Sep 1991

AIR STATION ORDER 11010.1E

From: Commanding General
To: Distribution List

Subj: OIL AND HAZARDOUS SUBSTANCES SPILL CONTINGENCY PLAN FOR MCAS, CHERRY POINT, MCALF, BOGUE, AND MCOLF, ATLANTIC

Ref: (a) Federal Water Pollution Control Act of 1972 (as amended)
(b) MCO P11000.8 Real Property Facilities Manual, Volume 5

Encl: (1) Spill Prevention, Containment, Cleanup, and Disposal Guidelines
(2) Petroleum, Oils, and Lubricants (POL) and Hazardous Material/Hazardous Waste (HM/HW) Spill Contingency Plan
(3) Spill Report Memorandum - Sample Format

1. Purpose. To revise existing POL's and HM/HW related pollution abatement and prevention procedures for MCAS, Cherry Point; MCALF, Bogue; and MCOLF, Atlantic; and to provide a coordinated response capability for oils and hazardous substance spills that may pose a threat to public health, welfare, environment, and fish and wildlife in accordance with references (a) and (b).

2. Cancellation. AirStaO 11010.1D.

3. Background. It is the continuing policy of the Commanding General to actively participate in environmental pollution abatement, to take positive planning and programming action to abate and correct POL's and HM/HW related pollution problems, and to incorporate appropriate pollution control and prevention facilities in all new construction aboard MCAS, Cherry Point; MCALF, Bogue; and MCOLF, Atlantic. The intent of this policy is to carry out the applicable measures of federal, state, and county regulatory agencies and to prohibit the discharge of POL's and HM/HW.

4. Responsibilities

a. Unit commanders and department heads are responsible for preventing spillage and other unauthorized discharges of POL's and HM/HW within their own areas; developing and implementing plans and procedures to prevent, contain, and clean up spillage or unauthorized discharge; and to report spills in compliance with applicable laws, rules and regulations, and enclosure (1).

b. The Station Fire Chief or his designated representative will provide initial response, containment, and assistance on any reported spill of POL's and HM/HW as outlined in enclosure (1) and shall act as on-scene coordinator (OSC) until relinquishing control to Facilities Maintenance Department (FMD) for cleanup. The Security Department, Fire Division, will provide a spill response truck. Materials to stock the truck will be provided by FMD.

c. The S-4, Marine Wing Support Squadron-271 (MWSS-271), MCALF, Bogue, will develop and implement a written procedure for the containment and cleanup of POL's and HM/HW spills aboard MCALF, Bogue, and forward copies to the Natural Resources and Environmental Affairs Officer (NREAO), the Station Fire Chief, Joint Safety Manager, Preventive Medicine Officer, Facilities Maintenance Officer (FMO), Naval Hospital/Industrial Hygiene Officer, and the Director of Supply. Procedures will be consistent with applicable regulations and enclosure (2).

d. Prior to approval of training exercises at MCOLF, Atlantic, the Operations Directorate shall require each unit to submit spill contingency plans specific to the planned exercise to NREAO. Spill contingency plans shall list the equipment and resources the unit will have on hand, and must demonstrate that the unit can contain and dispose of spills without relying on the limited garrison forces located at MCOLF, Atlantic. Spill contingency plans shall follow the same general format as enclosure (2).

e. The NREAO will maintain overall cognizance of the POL's and HM/HW management plan and:

(1) Report and enforce regulations on unauthorized discharges of POL's and HM/HW and related significant environmental problems involving unauthorized handling and disposal of POL's and HM/HW regulated by federal, state, and local authorities.

(2) Provide administrative and technical training/guidance as related to this Order.

f. The FMO or his designee will:

(1) Assume responsibility as OSC upon arrival at the scene of a POL or HM/HW spill unless the spill requires self-contained breathing apparatus and/or encapsulation suits. Under these conditions, the Fire Division will retain OSC cognizance until the specialized protective equipment is no longer required, then the FMO will assume the OSC role.

(2) Assume responsibility of OSC upon arrival at the scene of a POL or HM/HW spill once the Station Fire Chief or his representative has determined it is safe to do so.

(3) Provide central storage, collection, and transportation of HW and waste petroleum products (in designated areas) aboard MCAS, Cherry Point.

(4) Be responsible for the administration of a Station HW storage/transfer facility.

(5) Periodically inspect and maintain in good working order all booms, skimmer dams, and/or related facility/structure at Station drainage checkpoints and the Navy Boat Docks.

(6) Maintain a Spill Response Team with appropriate personnel training and backup support as directed by this Order.

g. The Chief Petty Officer, Utility Boat Docks, is responsible for:

(1) Training Navy Utility Boat Dock personnel to include POL spill cleanup and the use of the boom for spill containment in large bodies of water such as Slocum and Hancock Creeks and the Neuse River.

(2) Deployment and retrieval of the booms which are staged at the docks.

h. The Civilian Personnel Department will provide training for OSC and cleanup workers to meet Occupational Safety and Health Administration (OSHA) and Resource Conservation and Recovery Act (RCRA) requirements.

i. The Provost Marshal Officer will provide personnel to control access to the spill site when requested by the OSC in order to preserve the safety of the response crew or other persons nearby.

5. Action. Prohibit the discharge of POL's or HM/HW into or upon the land, streams, rivers, adjoining shorelines, or navigable waters in and around MCAS, Cherry Point; MCALF, Bogue; and MCOLF, Atlantic. Cognizant officers will take necessary action to assure compliance.

6. Summary of Revision. This Air Station Order has been completely revised and should be reviewed in its entirety.

7. Concurrence. The Commanding General, 2d Marine Aircraft Wing; the Commanding Officer, Naval Aviation Depot; the Commanding Officer, Naval Hospital; the Commanding Officer, Combat Service Support Detachment-21; and the Property Disposal Officer, Defense Reutilization and Marketing Office, concur with the contents of this Order insofar as it pertains to members of their commands.

J. Clark
J. CLARK
Chief of Staff
Acting

Distribution: A-2 plus LC (5)

SPILL PREVENTION, CONTAINMENT, CLEANUP, AND DISPOSAL GUIDELINES

1. The prevention of POL and HM/HW spills and the resultant environmental damage is the responsibility of all unit commanders.

2. All unit commanders and department heads will publish and prominently post directives setting forth detailed policies and procedures for the control, disposal, and prevention of hazardous substance and POL pollution applicable to their organization/area and consistent with this Order and applicable regulations.

3. All unit commanders and department heads will take the following actions:

a. Take positive measures to prevent spills to include a semiannual review of the maintenance, operational implementation, and training procedures used when handling POL's and HM/HW.

b. Conduct inspection of areas and facilities assigned to ensure compliance with published procedures and/or directives. A HW/HM coordinator designated by unit commanders/department heads shall:

(1) Inspect areas of responsibility to ensure that no POL's or hazardous substance is creating or has created a spill and keep inspection records.

(2) Inspect containers of POL's or HM/HW to ensure that they are in good condition. This is of particular importance for containers of corrosive materials. Further ensure that containers are capped, plugged, and/or protected to prevent infiltration of rainwater.

c. Establish immediate action procedures to improve pollution controls including the stocking of materials required to contain and/or clean up small POL and HM/HW spills.

d. Ensure that all personnel within their command are thoroughly indoctrinated regarding the environmental impact of POL's and HM/HW.

e. Encourage maximum reuse of technically contaminated fuels by multi-fuel, engine-powered tactical vehicles.

f. Other POL's may be deposited in approved containers for recycling or disposal. Contact FMD, extension 4364, to arrange for pickup by FMD and testing by NREAO.

g. POL saturated soil and/or cleanup material should be disposed of as directed by the OSC and any removed soil should be replaced with fresh earth and reseeded.

h. To dispose of water-contaminated aviation fuels, contact FMD, extension 4364.

i. Disposal of POL's and HM/HW such as acids, poisons, and solvents through drainage system to include sinks, washracks, storm drains, and natural drainage systems is specifically prohibited. These products will be segregated, stored in suitable containers, and disposed of in accordance with instructions provided by Air Station Order 6280.1.

j. POL containers will be disposed of according to standing instructions from the NREAO, extension 3631, and/or recycled, if appropriate, with the exception of 55-gallon drums and durable metal containers which will be disposed of through the Defense Reutilization and Marketing Office, extension 5905.

k. Personnel changing POL's from other than government-owned vehicles/equipment will use established MCX Service Station or Morale, Welfare, and Recreation facilities, and deposit waste POL's in any one of the authorized collection tanks.

l. All supplies of HM/HW and POL's shall be stored in areas that, upon spillage or container rupture, would curtail chance of spread of pollution into other areas; i.e., drainage ditch or structure that would eventually lead to stream, pond, or treatment facility. If such an area is not available, an impervious berm sufficient to contain any expected spill shall be built around the containers. Prior to initiating action contained within this report, contact will be made with the NREAO, extension 3631. POL's and gasoline storage containers of 55-gallon capacity or more will be diked to include a rainwater drainage line and valve. The valve will only be operated by personnel authorized by the unit commander/department head.

n. Aircraft, aircraft wing tanks, etc., will be washed only at washracks associated with the Industrial Waste Treatment Facility. There are three such washracks on this Air Station: one at the corner of 6th Avenue and "A" Street, northeast of Tank Farm "A," and one at the C-130 washrack. Purging fuel tanks of all excess fuel shall ONLY BE DONE INTO APPROPRIATE CONTAINERS and shall be done PRIOR to washing out the tanks at the above designated washracks.

o. POL's from leaking aircraft parked on the flight line have been known to accumulate in flight line distribution pits (wells); i.e., air, electrical, etc. Accumulated POL's in these pits constitute a potential safety hazard. The following procedures will be adopted to prevent explosions in POL-filled pits (wells):

(1) Drip pans will be placed under the fuel tanks of secured aircraft that are parked where leakage could accumulate in the pits.

(2) Maintenance personnel from the appropriate units will be assigned to check the pits periodically and call the Fire Division if POL's are present.

4. Field operations will comply with the following guidance:

a. All tactical refueling systems installed on base must first be approved by the Director of Facilities.

b. Fuel stored in tactical refueling systems will be properly diked as required by current regulations; i.e., the dike must be capable of containing at least 1 1/2 times the volume of the container.

c. When using fuel tanker vehicles, the following actions will be taken:

(1) Hoses, nozzles, and connections will be checked frequently for serviceability to avoid leakage of fuel.

(2) Refueler/defueler operators will stay with the vehicle during refueling/defueling operations.

(3) Refueler/defueler vehicles containing fuel will be parked in such a manner as to avoid the possibility of fuel entering natural or manmade drainage systems.

(4) During recirculation operations, nozzles will be secured to the vehicle.

(5) All waste petroleum products generated during field exercises will be stored (55-gallon drums, etc.) and disposal instructions obtained from the NREAO, extension 4186.

5. Unit commanders and department heads should contact the Facilities Development Officer, Facilities Directorate, for temporary and permanent facilities needed at their sites for storage of POL's and HM/HW. Prevention of POL and HM/HW spills, through proper storage and handling, shall be achieved by strict adherence to procedures outlined in these guidelines.

PETROLEUM, OIL, AND LUBRICANTS (POL) AND HAZARDOUS MATERIAL/HAZARDOUS WASTE (HM/HW) SPILL CONTINGENCY PLAN

1. Reporting Spills of POL's and HM/HW. All spills of POL's or HM/HW shall be reported immediately and followed up by spill report memorandum, enclosure (3), to responsible parties (OSC to NREAO). The report shall include the approximate amount, type of substance, and movement of the substance to any drains or waterways if contained and if cleanup is in progress, plus the name and phone number of the reporting personnel.

a. Runway Areas. POL's and/or HM/HW spills on runways shall be reported immediately to the Crash Crew Officer, extension 2131/2420, giving the above information. The Crash Crew Officer will dispatch personnel to contain the spill.

b. Non-Runway Areas. POL's or HW/HM spills shall be reported immediately to the Fire Division, extension 2241, who will respond and notify FMD.

c. HM or HW Spills. Spills of HM or HW, regardless of their location, shall be reported as above. HM or HW will be contained with an absorbent material but will not be removed until authorized by the NREAO or the designated HM Industrial Hygienist.

d. Reporting Off-Station. The North Carolina Division of Environmental Management will be contacted by the NREAO when a spill enters any type of water source. After apprising the Director of Facilities, the NREAO will be responsible for placing the call during normal working hours. After working hours or when the NREAO is not available, the OSC shall assume this responsibility. As soon as practical thereafter, the NREAO shall draft a message to cognizant parties as required by applicable MC directives.

e. Responsibilities for Ensuring Personnel and Public Safety. If a spill threatens surrounding civilian communities, the OSC in charge of spill removal shall contact the Joint Public Affairs Officer, the designated HM Industrial Hygienist, and the Station Security Officer. The provisions of the Mutual Assistance Agreement for Hazardous Materials Spills and Leaks apply.

f. Posting Spill Contingency Procedures. Notices will be posted in a prominent, highly visible location in every building/tank location and field service location where POL's or HM/HW are stored, used, and/or generated. These notices will be issued by the OSC (i.e., FMO) upon request of unit commanders or department heads and will contain the following information (may be typed or printed on yellow paper, 8 1/2 by 11 inches, and placed in plastic or a picture frame):

"In case of a POL or HM/HW spill:

On Non-Runway Areas: Call Security Department, Fire Division

On Base........................2241/3333
Off Base..................466-2241/3333

On Runway Areas: Call Crash Crew Office

On Base........................2131/2420

Report to NREAO, extension 4186/3631, substance spilled, estimated quantity, movement of substance in water, and name and telephone number.

Remain in area at a safe distance. Do not wash down with water and keep personnel out of the area. Block run-off with earth materials when possible to prevent spreading."

2. Spill Containment and Cleanup

a. After notification by the Fire Division and/or Crash Crew Officer, the appropriate OSC shall take the following actions immediately, including activating the Oil Spill Response Team when required.

b. Small Spills (less than one gallon)

(1) Gasoline or fuel oil spills that occur at refueling and or defueling locations from over-filling or blow-back must be reported to NREAO, extension 4186/3631, who will notify the appropriate OSC, if required. The spill must be promptly cleaned up, normally by the person at the scene.

(2) Containment Procedures Prior to Arrival of On-Scene Coordinator

(a) DO NOT FLUSH INTO STORM SEWER OR DRAINAGE DITCH.

(b) Cover entire spill with sand or absorbent material and continue to add more material as long as the liquid appears on the surface of the sand or absorbent material.

(c) Clean up contaminated sand or absorbent material with brooms and shovel and place it in a metal container for disposal or possible reuse.

(d) Reapply a second coat of sand or absorbent material in a very light layer to assure all gasoline or fuel oils have been blotted up. Brush material back and forth over the area and sweep up completely and containerize.

(3) After completion of spill cleanup, if storage bins of sand or absorbent material are one-half full or less, request (via chain of command) the purchase of additional material.

c. Spills (more than one gallon) On Runway Areas (paved or unpaved)

(1) Reporting: Call Station Crash Crew, extension 2131/2420.

(2) Containment Procedures Prior to Arrival of On-Scene Coordinator

(a) DO NOT FLUSH INTO STORM SEWER OR DRAINAGE DITCH.

(b) The person on site shall erect a two-to three-inch high sand or earth dam downstream and/or in the direction t at the spill is flowing. A trench or sump may be used in lieu of a dam.

(c) Apply sand or absorbent materials that are available around the perimeter of the spill until the Station Crash Crew personnel arrive. Keep other personnel away from the area.

(d) Station Crash Crew personnel shall continue abatement methods using equipment available until the appropriate OSC arrives to determine further containment and cleanup requirements.

d. Spills (more than one gallon) on Non-Runway Areas

(1) Reporting: Call the Fire Division, extension 2241/3333.

(2) Containment Procedures

(a) DO NOT FLUSH INTO STORM SEWER OR DRAINAGE DITCH.

(b) The person on site shall erect a minimum three inch high sand or earth dam downstream and/or in the direction the spill is flowing. The dam should be made higher if the liquid pool behind the temporary dam rises to within two inches of the top. A trench or sump may be used in lieu of a dam.

(3) Apply sand or absorbent materials that are available around the perimeter of the spill until the Fire Division arrives. Keep other personnel away from the area.

(4) The Fire Division shall continue abatement methods using equipment available until the OSC arrives to determine further containment and cleanup requirements.

(5) The liable unit or activity shall install dams, straw barriers, absorbents, pumping equipment, and other abatement or cleanup equipment as directed by the OSC, with assistance from the Spill Response Team.

e. Spills Entering Storm Drainage Systems

(1) Reporting: Call the Fire Division, extension 2241/3333 immediately and emphasize that the liquid has entered a catch basin, manhole, drainage ditch, or any structure (pit) below ground.

(2) Containment Procedures Prior to Arrival of On-Scene Coordinator

(a) DO NOT ADD WATER TO FLUSH OUT STORM SEWER OR STRUCTURE.

(b) The person on site shall apply sand or absorbent materials that are available around the perimeter of the spill and at the manhole or catch basin until the Fire Division arrives.

(c) The Fire Division shall continue abatement methods using equipment available until the appropriate OSC arrives to determine further containment and cleanup requirements.

(d) The liable unit or activity, in conjunction with the Spill Response Team, shall place oil booms across the storm drain to prevent further contamination. After booms are in place, cleanup will be initiated. Action may include the following:

1 All confined spaces must be certified "gas-free" prior to entry.

2 Inspect downstream manholes for evidence of oil progression toward discharge. If storm system has a very low flow, install straw barrier or absorbent dam inside manhole.

3 Install plug in upstream side of manhole spill if extremely low flow exists to help curtail spill movement.

4 If the drainage system has an open ditch, install straw bale dams or absorbent dam to collect spilled materials.

5 Isolate street with contaminated manholes to prevent fires or explosions.

(3) The appropriate OSC shall determine further containment and cleanup requirements after arriving on the scene.

f. Spills Entering Surface Waters

(1) Reporting: Call the Fire Division, extension 2241/3333 immediately and emphasize that the liquid is discharging directly into the surface waters.

(2) The Fire Division will notify NREAO immediately.

(3) Containment Procedures Prior to Arrival of OSC

(a) The person at the site should check the source of the spill to be assured that no further discharge can occur. Close valves, remove hose, or isolate the source to prevent any further release of materials.

(b) Do not allow boats or equipment to enter the surface waters where the spill has occurred. If surface type oil absorbents are available, begin spreading this material wherever an oil skim is observed. Do not enter the water to apply this material until the Fire Division arrives.

(c) The Fire Division shall continue abatement methods using equipment available until the appropriate OSC arrives to determine further containment and cleanup requirements.

(d) The liable unit or activity, in conjunction with the Spill Response Team, shall install booms, skimmers, pumps, and other abatement or cleanup equipment as directed by the OSC.

(e) When the spill necessitates deployment of the boom stored at the Utility Boat Docks, the Chief Petty Officer will respond as directed by the OSC. This would normally be necessary when a spill occurs on large bodies of water such as the Neuse River or Hancock or Slocum Creeks.

3. Secondary Response to Spill

a. FMD

(1) The FMD will purchase and maintain the materials and equipment necessary for spill cleanup.

(2) The FMD or his designee will assume the duties of OSC when the Station Fire Chief or his representative declare such action to be safe and shall perform the following duties:

(a) Report spills that discharge into the inland or coastal waters to NREAO.

(b) Request U.S. Coast Guard assistance, via appropriate channels, for water spills that cannot be contained promptly by the Spill Response Team.

(c) If the source of the spill cannot be determined, or if weather conditions or spill circumstances warrant immediate action, the Spill Response Team will be responsible for the total cleanup.

(d) If the source of a spill can be determined, the OSC will inform the responsible unit's commanding officer (for 2dMAW, contact Wing Environmental Protection Officer, extension 3505/3510). He will task the unit with providing a cleanup crew. The crew will be assembled within one-half hour, will contact the OSC, and will take directions from him on removing the spill in conjunction with the Spill Response Team.

(e) Monitor all areas designated by the NREAO and activate spill contingency plans if POL's and/or HM/HW are found.

(f) The FMD will provide cleanup materials for spills in drains and waterways as required; i. e., absorbent, pads, booms, etc.

b. Spill Response Support Team

(1) Commanding officers of the following organizations will provide a five-man detail to serve on a rotation basis as the Spill Response Support Team.

H&HS, STATION	MWSG-27
SOES	MACG-28

MWHS-2
MAG-14

CSSD-2?
MAG-32

(2) The detail will consist of one NCOIC (sergeant or above) Marines (lance corporals or below). The commanding officers of these shall be responsible for staffing the Spill Response Support Team and available immediately during normal duty hours (0730-1600, Monday throu within one-half hour during non-duty hours for duty under the direction Members will serve for a period of one month and will be subject to duty 24-hour basis, seven days a week. Scheduling (two weeks in advance) wil responsibility of the FMD's OSC.

(3) The NCOIC of the Spill Response Support Team, once assigned t shall receive training from HREA in spill cleanup and will not be granted except in emergency cases during the period his unit is responsible for pr the team. The NCOIC shall maintain a roster of available unit personnel fo team. His name shall be furnished to the FMD one week prior to assignment.

(4) The Spill Response Support Team will not be used by the Naval Av Depot (NAVAVNDEPOT) since that Command has its own capability for quick s response. However, the NAVAVNDEPOT must report spills to HREAO for off-S reporting requirements. The Naval Hospital is not tasked with providing a tea it has small potential for POL s or HM/HW spillage. The Hospital must also re spills to HREAO for off-Station reporting requirements.

c. Transportation. At the request of the OSC, the Motor Transport Officer, Facilities Directorate, will provide a vehicle or vehicles as required to transp the Spill Response Support Team or cleanup crew(s) and to carry supplies and spi wastes to and from the spill site.

d. Supplies

(1) The FMD will be responsible for obtaining and storing supplies necessa for removing spills.

(2) Units will be responsible for stocking sufficient supplies of absorbent material and appropriate containers to take care of small spills.

e. Responsibilities for Ensuring Public Safety.

(1) Overall responsibility for ensuring the safety of personnel involved in the containment and cleanup of POL and HM/HW spills is assigned to the Station Fire Chief or his senior representative. The Station Fire Chief, or his representative, shall continue to monitor the situation and will provide required standby personnel and equipment. The Station Fire Chief will request the assistance of the Joint Safety Officer and Naval Hospital Industrial Hygienist as needed and shall keep the OSC informed of any safety considerations affecting the containment and cleanup of the spill. In the event of an imminent hazard to personnel involved in the spill cleanup or to the public, the Station Fire Chief shall take appropriate action as directed by references (a) and (b). The OSC shall assist the Station Fire Chief in implementing the required safety procedures.

Enclosure (2)

(2) The Joint Safety Officer and the Naval Hospital Industrial Hygienist shall dispatch a representative to the spill scene upon request from the Station Fire Chief, his representative, or the OSC. The representative will remain at the scene until advised by the Station Fire-Chief, his representative, or the OSC that assistance is no longer required. The Safety representative will monitor all activity at or near the spill and make appropriate recommendations to the Station Fire Chief or the OSC.

f. Fiscal. In circumstances when the unit responsible for the spill is determined after spill cleanup is completed, the unit will be charged for the cost of the non-unit cleanup materials and labor by the Director of Facilities. In cases where the unit responsible for the spill is known and has provided a cleanup team, they shall be charged, through the Director of Facilities, for the cost of any cleanup materials used.

g. Natural Resources and Environmental Affairs Officer. The NREAO will develop maps of drainage systems as required for boom placement and drainage points to be monitored.

Draft Air Station Order 5090.7

Draft

6-20-96

AIR STATION ORDER 5090.7

From: Commanding General
To: Distribution List

Subj: OIL AND HAZARDOUS SUBSTANCES SPILL CONTINGENCY PLAN

Ref: (a) Federal Water Pollution Control Act of 1972 (as amended) (NOTAL)
(b) 29 Code of Federal Regulations (CFR) 1910 Occupational Safety and Health Standards (OSHA) (NOTAL)
(c) 40 CFR 112 Oil Pollution Prevention (NOTAL)
(d) 40 CFR 300 National Oil and Hazardous Substances Pollution Contingency Plan (NOTAL)
(e) North Carolina Oil Pollution and Hazardous Substance Control Act (NOTAL)
(f) MCO P5090.2 (NOTAL)
(g) U.S. Marine Corps Commander's Guide to Environmental Compliance and Protection, July 1992
(h) AirStaO 5090.5
(i) AirStaO 5090.1
(j) AirStaO P5100.8A
(k) Naval Sea Systems Command (NAVSEA) Instruction 4740.8A (NOTAL)
(l) AirStaO 5090.3

Encl: (1) Reports Required
(2) Site Location Map, MCAS Cherry Point, North Carolina
(3) Spill Response Training Requirements
(4) Spill Report for Environmental Affairs Department
(5) Emergency Notification and Actions, Discoverer/Spiller
(6) Secondary Containment Structure Inspection and Maintenance Record

Reports Required: See enclosure (1).

1. Purpose. To update the oil and hazardous substance pollution prevention procedures for MCAS Cherry Point and outlying fields, and to designate a response network for oil and hazardous substance spills to minimize threats to public health and the environment

2. Cancellation. AirStaO 11010.1E.

3. Background. The policy of the Commanding General (CG) is promotion of environmental protection, planning, and programming resources to prevent and abate oil and hazardous substances pollution, and incorporation of pollution control measures in all new construction aboard MCAS Cherry Point and the outlying fields. This policy implements references (a) through (k) which are regulations and directives promulgated to protect the environment and eliminate oil and hazardous substance spills.

4. Summary of Revision. This Order has been reformatted and contains major changes. The major modifications to this Order are as follows:

a. Paragraph 5.f. The CG has been appointed the On-Scene Coordinator (OSC).

b. Paragraph 5.j. Establishes the Environmental Coordinator as the predesignated squadron/department representative responsible for coordination of activities related to oil and hazardous substance spills.

c. Paragraph 5.g. This Order establishes the position of On-Scene Commander (OSCDR) to direct spill response operations for the Air Station. Separate OSCDR positions are established for the Air Station ~~of the Airfield~~ (including the airfield) and MCALF Bogue.

d. Paragraph 5.h. This Oder establishes the On-Scene Operations Team (OSOT) to assist the OSCDR during spill response operations.

e. Paragraph 6.d.(3). Requires that all personnel responding to oil and hazardous substance spills meet minimal training requirements and have appropriate PPE as outlined in reference (b).

f. Paragraph 6.e.(4). Establishes a requirement for squadrons/departments to develop, test, and implement oil and hazardous substance spill response plans. These plans must be tested using simulated spill scenarios annually.

g. Paragraph 6.i.(6)(g). Establishes debrief meetings for spill responses which are deemed serious or to which response was inadequate with agencies involved.

h. Paragraph 6.i.(6)(n). Provides guidance for reporting oil and hazardous substance spills to appropriate federal and state agencies.

i. Paragraph 7. Provides guidance for activating NAVSEA and contractor support.

5. Definitions

a. Airfield. All runways and taxiways at the Air Station. Does not include the inside of hangers and other buildings along the flightline or the Naval Aviation Depot.

b. Emergency Response or Responding to Emergencies. A response effort by employees from outside the immediate release area or by other designated responders (i.e., CFR's, Station Fire Dept.) to an occurrence which results, or is likely to result in an uncontrolled release or oil or hazardous substance. Responses to incidental releases of oil or hazardous substances where the substance can be neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses. Responses to releases of oil or hazardous substances where there is no potential safety or health or environmental hazard (i.e., fire, explosion or chemical hazard) are not considered to be emergency responses.

c. Environment. The environment means any surface water, groundwater, drinking water supply, land surface, subsurface strata, or air within the jurisdiction of the United States. Impervious surfaces are not included in this definition.

d. Hazardous Substance. For the purpose of this Order, the following are considered hazardous substances.

(1) Any hazardous material which, because of its quantity; concentration; and physical, chemical, or infectious characteristics, may pose a hazard to health and/or the environment.

(2) Any untreated domestic and industrial sewage.

(3) Any hazardous waste demonstrating the characteristics of ignitability, corrosity, reactivity, or toxicity or listed under Part 261 of the Resource Conservation and Recovery Act (RCRA).

(4) All of the sites in enclosure (2) are considered to be contaminated with hazardous wastes for emergency response purposes.

(5) Any hazardous air pollutant listed under Section 112 of the Clean Air Act.

(6) Any toxic pollutant listed under Section 307(a) of the Clean Water Act.

(7) Any imminently hazardous chemical substance or mixture pursuant to Section 7 of the Toxic Substances Control Act.

(9) Any extremely hazardous substance listed in 40 CFR 355 Appendix A or B, that has been established by the EPA, that could cause serious, irreversible health effects from accidental releases.

(8) This term does not include petroleum products such as fuel oil, natural gas, natural gas liquids, synthetic gas usable for fuel, aviation fuels, hydraulic fluid, lubricating oil, grease, diesel, or kerosene.

e. Oil. Oil of any kind or in any form, including but not limited to petroleum products, fuel oil, fuel sludge, natural gas, natural gas liquids, synthetic gas usable for fuel, aviation fuels, hydraulic fluid, lubricating oils, grease, diesel, kerosene, or other liquid hydrocarbons.

f. On Scene Coordinator (OSC). The CG of MCAS Cherry Point is responsible for coordinating and directing Marine Corps oil and hazardous substance spill responses for MCABE assets.

g. On Scene Commander (OSCDR). Officials designated by the CG to direct operations for the initial response, containment, and cleanup of oil and hazardous substance spills.

h. On Site Operations Team (OSOT). Personnel trained and equipped for the initial response, control, containment, and cleanup of oil and hazardous substance spills. The OSOT shall consist of representatives from the following activities: Air Station Fire Division (FD); Aviation Crash Fire Rescue at Bogue Field (CFR at MCALF Bogue); Facilities Maintenance Department (FMD); Naval Aviation Depot (NAVAVNDEPOT); Utility Boat Division; Environmental Affairs Department (EAD); Naval Hospital, Industrial Hygiene Division; Provost Marshal's Office (PMO); and Department of Safety and Standardization (DSS).

i. Impervious surfaces. Areas of the ground surface covered with a permanent impervious material such as concrete. Areas temporarily covered with a material such as plastic sheeting shall not be considered an "impervious surface".

j. Environmental Coordinator (EC). The EC, which is appointed in accordance with reference (l), is the predesignated squadron/department representative that will ensure oil and hazardous substance spills are reported to appropriate Air Station organizations and if possible, initiate, coordinate, and direct the spill response until relieved by the designated OSCDR. The EC's duties are detailed in 6.e.

k. Unit Response Personnel (URP). Squadron/department personnel knowledgeable of the nature and quantity of oil and hazardous substances in their workplaces that are able control or cleanup under the direct supervision of the OSCDR, or the EC until the OSCDR arrives.

l. Reportable Quantity. Amount of a substance that when released must be reported to federal and/or state authorities.

m. Spill. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injection, escaping, leaching, dumping, or disposing into the environment or onto im pervious surfaces (including the abandonment or discarding of barrels, containers, or other closed receptacles) of any oil or hazardous substances.

6. Action

a. The OSC is responsible for coordinating and directing actions to mitigate the health, safety, and environmental threats posed by an oil or hazardous substance spill from activities aboard the Air Station and outlying fields.

b. The OSCDR shall notify and update the Air Station Chief of Staff, the Director of Facilities, or the duty officer of the status of a spill event. The Chief of Staff, Director of Facilities, or the duty officer is responsible for notifying and updating the CG and the Public Affairs Officer of the response status.

c. All personnel shall:

(1) Report oil and hazardous substance spills in compliance with this directive and enclosures. All oil and hazardous substance spills which occur on the Air Station, Airfield or Outlying Fields (excluding oil spills at MCALF Bogue), shall be reported by telephone to the FD at 466-2241/3333. All oil spills which occur at MCALF Bogue shall be reported by telephone to CFR at MCALF Bogue at 466-0662. Complete reporting procedures are listed in enclosure (5).

(2) Personnel not trained in accordance with reference (b) shall not attempt emergency response to oil and hazardous substance releases. Station personnel can participate in oil spill cleanup operations if they comply with 29 CRF 1910.120 (q)(11).

d. Squadron commanders and department heads shall:

(1) Provide funding for spill response/cleanup costs. Sufficient funds shall be provided to stock necessary response/cleanup supplies and equipment. Procedures of cost recovery shall be coordinated between Air Station and tenant command comptrollers.

(2) Commanding officers of the following organizations will provide a five-person detail to serve on a rotational basis as the Spill Response Support Team, led by the Facilities Maintenance Officer (FMO): Headquarters and Headquarters Squadron, Station; Station Operations and Engineering Squadron; Marine Wing Support Group-27; Marine Air Control Group-28; Marine Wing Headquarters Squadron-2; Marine Aircraft Group-14; Combat Service Support Detachment-21.

(a) Assign one Noncommissioned Officer in Charge (NCOIC), sergeant or above, and four lance corporals or below.

(b) Ensure the Spill Response Support Team is available within one-half hour upon activation by the OSCDR.

(3) Ensure only appropriately equipped and trained personnel in accordance with reference (b) and enclosure (3) respond to emergency oil and hazardous substance releases.

(4) Prevent oil and hazardous substance spills and the resulting environmental damage.

e. The EC shall:

(1) Notify by telephone, the FD at 466-2241/3333 of all oil and hazardous substance spills which occur on the Air Station, Airfield, or Outlying Fields (excluding oil spills at MCALF Bogue). All oil spills which occur at MCALF Bogue shall be reported by telephone to CFR at Bogue at 466-0662. The FMD Response Team (and or the NAVAVDEPOT Spill Response Team when the spill occurs in the NAVAVDEPOT) shall be notified to provide assistance with cleanup, if required, by the responsible unit/department EC, Assistant EC, or other designated personnel.

(2) Designate an assistant to act in his absence.

(3) Designate URP and ensure all URP have appropriate equipment and spill response training in accordance with reference (b) and enclosure (3) prior to working on a oil or hazardous substance spill.

(4) Develop and implement a Spill Contingency Plan to prevent and cleanup spillage and to eliminate unauthorized discharges of oil and hazardous substances in accordance with this AirStaO. The Plan shall address the following areas as a minimum:

(a) Emergency Procedures

1. Reporting of Spills during and after working normal working hours.

2. Containment of Spills.

3. Cleanup of spills, including equipment and staffing.

4. First aid measures.

5. Evacuation plan.

(b) Spill History File - A spill history file shall be developed to be included as part of the plan. Enclosure (4) is to be used to document and report each spill as detailed in this Order.

(c) The Plan shall be reviewed with all personnel within the squadron on six month intervals at a minimum or when major revisions occur.

(d) A simulated exercise of the plan shall be implemented by the EC at least once annually. Lessons learned from the exercise shall be incorporated into a revision of the plan. The EC shall revise the plan when the physical facilities, for which he or she is responsible, are altered in such a way as to affect the response efforts specified in the plan.

(e) The plan shall be submitted to the Environmental Affairs Officer for review and approval once annually or whenever revised.

(5) Ensure sufficient supplies and response equipment are stocked to contain and cleanup spills.

(6) Post enclosure (5) in a prominent, highly-visible location in every building, tank location, and field service location where oil or hazardous substances are stored, used, and/or generated. Enclosure (5) shall be typed or printed in black on a yellow background, a minimum size of 8 1/2 by 11 inches, and shall be inherently waterproof; covered in plastic or enclosed in a glassed/lexan frame.

(7) Coordinate with the Safety and Standardization Officer (SSO) for the purpose of conducting random simulations, to test the adequacy of the units Spill Contingency Plan. A simulation plan shall be forwarded to the SSO by the EC, when requested by the SSO, for coordination with Air Station response organizations. A written critique of the simulation shall be performed by the SSO and forwarded to the EC and the EAO for review. The EC shall utilize the critique to improve and update the plan. This simulation shall satisfy the annual exercise requirements of 6.e.(4)(d) above.

(8) Forward formal written spill reports, shown in enclosure (4), to the EAO within five working days of the incident for all spills of hazardous substances regardless of quantity or location. Oil spills will be reported using enclosure (4) as follows:

(a) All spills of oil into the environment.

(b) All oil spills of a quantity greater than one gallon onto impervious surfac

(c) Oil spills of one gallon or less onto an impervious surfaces will not require a written report to the EAO, but will require notification by telephone to the FD, CFR or CFR at Bogue in accordance with this order.

(9) Ensure that all oil and hazardous substance transfer operations occur within secondary containment. Where permanent secondary containment is not feasible, drip pans shall be used.

(10) Ensure appropriate Department of Transportation (DOT) approved handling equipment is provided for moving oil and hazardous substances.

(11) Inspect areas of responsibility daily on all workdays (non-workdays shall be annotated in the log book) to ensure that oil and hazardous substances are not creating or have not created a spill. Maintain a log book of those inspections to include: date and time of inspections, inspectors name, observations, and remedial/repair actions taken or necessary. Inspect containers of oil or hazardous substance to ensure that they are in good condition. This is of particular importance for containers of corrosive materials. Further, ensure that containers are capped, plugged, and/or protected to prevent infiltration of rainwater. Containers of hazardous waste must, by law, remain closed unless contents are being added to or withdrawn.

(12) Inspect secondary containment systems daily during the inspections required in 6.e.(e)(11) above. Each time accumulated rainwater is released from secondary containment areas (i.e., hazardous materials storage areas, petroleum/oil/lubricant storage sites (including above ground fuel storage tanks), and hazardous waste accumulation/storage sites, a copy of the Secondary Containment Structure Inspection and Maintenance Form, enclosure (6), shall be completed and the original submitted to the Environmental Affairs Department (EAD), by the fifteenth of the following month. Release valves must be secured by a locking device with the key maintained in a secured location. Prior to any discharge personnel are to inspect accumulated water for signs of contamination. Do not release contaminated water into the Air Station drainage system. If contamination is noted, the Facilities Maintenance Department Work Reception Branch (466-4364) should be contacted to remove the contaminated water. At a minimum, all secondary containment systems shall be drained (pumped out if contamination exist) and a written inspection prepared and forwarded to EAD when accumulated liquids have reached ten percent of the secondary containment holding capacity. The unit shall maintain a file containing a copy of all written inspections.

(13) Ensure that all personnel within their unit are thoroughly indoctrinated regarding the health and environmental impact of oil and hazardous substances.

(14) Ensure contaminated oil is deposited in approved containers for recycling or disposal. Contact the Facilities Maintenance Department (466-4364) to dispose of water contaminated fuels and to arrange for pickup and testing of contaminated oil.

(15) Ensure contaminated soil and cleanup materials are disposed of in accordance with reference (h). Any soil removed shall be replaced with clean earthen fill material.

(16) Prohibit the disposal of oil and hazardous substances (e.g., acids, poisons, and solvents) through drainage system including sinks, washracks, storm drains, and natural drainage systems. These products will be segregated, stored in suitable containers, managed, and disposed of in accordance with reference (h).

(17) Ensure all oil and hazardous substances accumulation sites and operating stationary equipment such as generators, that require refueling, are located within secondary containment which is not subject to flooding. Refuelers/defuelers shall be located within a secondary containment not subject to flooding when they are parked over night or used for dispensing ground fuels in a stationary location. Construction of secondary containment, using sandbags and an impervious liner, can be utilized for a short time as a temporary measure until a permanent concrete containment area can be constructed. Drainage valves installed to release rain water shall be locked until the containment area is drained. Secondary containment structures shall be sized sufficiently to contain the largest volume or tank size stored within the structure, plus an eight inch freeboard. Prior to constructing a storage area for oil or hazardous substances storage or use, contact shall be made with the EAD, to receive approval of the location. Contact the Facilities Development Officer, for temporary and permanent facilities needed for storage of oil and hazardous substance.

(18) Ensure that all aircraft, wing tanks, etc., are washed only at washracks which drain to the Industrial Wastewater Treatment Plant (IWTP). There are two washracks for aircraft cleaning on the Air Station; one at the corner of 6th Avenue and "A" Street, the other is located northeast of Tank Farm "A". Purging fuel tanks of all excess fuel shall ONLY BE DONE INTO APPROPRIATE CONTAINERS and shall be done PRIOR to washing out the tanks at the above designated washracks.

(19) Limit oil from leaking aircraft parked on the flightline which have been known to accumulate in flightline distribution manholes and vaults (i.e., air, electrical, etc.). Accumulated oil in these manholes and vaults constitute a potential safety hazard. The following procedures will be adopted to prevent explosions in oil-filled manholes and vaults.

(a) Drip pans shall be placed under the fuel tanks of secured aircraft, generators, and other equipment prone to leakage and remain in place during operation. The squadron/department must have a system to drain drip pans into DOT approved containers for disposal.

(b) Maintenance personnel from the appropriate squadron/department will be assigned to check the refueling pits periodically and call the Air Station Fire Division if fuels are present.

(20) Ensure personnel within the unit who change oil in nongovernment-owned vehicles/equipment use the established Morale, Welfare and Recreation facilities, and deposit waste oil in any one of the authorized collection tanks.

(21) Ensure field operations will comply with reference (i) and the following guidance:

(a) All tactical refueling systems to be assembled, constructed, or installed on the Air Station must first be approved by the Director of Facilities, through the EAD, prior to installation.

(b) Fuel stored in tactical refueling systems, including fuel tankers utilized as a fueling source for ground vehicles, will be properly bermed using sandbags and an impermeable liner. As required by Air Stations current storm water permit, the berm must be capable of retaining the contents of the largest container stored within the containment area plus the water generated from an eight inch rain.

(c) When using fuel tanker vehicles, the following actions shall be taken:

1. Hoses, nozzles, and connections will be checked frequently for serviceability to avoid leakage of fuel.

2. Refueler/defueler operators shall maintain visual surveillance of the vehicle during refueling/defueling operations.

3. Refueler/defueler vehicles containing fuel shall be parked in such a manner as to avoid the possibility of fuel entering natural or man-made drainage systems and utilize a means of secondary containment when parked over night or used for dispensing ground fuels in a stationary location.

4. During recirculation operations, nozzles will be secured to the vehicle.

5. All waste oil generated during field exercises shall be stored (55-gallon drums, etc.) and disposed of in accordance with reference (h).

f. The Air Station Fire Chief (initial OSCDR for the Air Station, Airfield and Outlying Fields excluding oil spills at MCALF Bogue) shall:

(1) Provide initial emergency response on all reported oil and hazardous substance spills which occur on the Air Station, Airfield, and Outlying Fields (excluding oil spills at MCALF Bogue) when in his or her judgment a response by the FD is required and serve as the OSCDR until spill threats are minimized as detailed in (2) below.

(2) Determine when to turn the OSCDR responsibilities over to the FMO and or NAVAVNDEPOT Spill Response Team (spills within NAVANDEPOT only) for cleanup operations. The Air Station Fire Chief shall not relinquish control as OSCDR to the FMO if the oil or hazardous substance spill requires self-contained breathing apparatus and/or encapsulated suits. Under these conditions, the Air Station Fire Chief will retain OSCDR responsibilities until the requirement for specialized PPE is downgraded. The Naval Hospital, Industrial Hygiene Division shall assist in determining when the site/event is safe for the FMO and or NAVAVNDEPOT Spill Response Team to begin cleanup operations, when requested by the Station Fire Chief.

(3) Brief the Air Station Chief of Staff, the Director of Facilities, or the duty officer on spill impacts after arriving on scene.

(4) Provide a spill response vehicle. Provide a list of supplies necessary to maintain the spill response vehicle to the FMO.

(5) Notify the EAO of all reported spills during both duty and non-duty hours as follows:

(1) Notify EAD as soon as possible of all spills reported during normal working hours (0700 to 1645, Monday through Friday).

(2) After normal working hours, all hazardous substance spills, all oil spills into the environment (on the land surface, into a drain into air, or into surface waters) or which pose an immediate threat to the environment, or oil spills of five gallons or greater on impervious surface shall be reported to the EAO immediately.

(3) Oil spills less than five gallons on impervious surfaces and which are reported after regular working hours shall be reported to EAD the following work day between the hours of 0730 and 0900.

(6) Ensure that all individuals responding to emergency oil and hazardous substance spills have appropriate equipment and meet training requirements in accordance with reference (b) and enclosure (3).

(7) Provide operational control and storage for two (currently the FD controls a 21' Sea Ark runabout and a 28' Sea Ark Boom Barge) open water spill response boats. The Aerial Surface Targets Department shall provide preventative maintenance and personnel to operate the boats when requested by the Fire Chief. EAD will provide funding for boat maintenance.

(8) Request assistance, if required, from the NAVAVDEPOT Commanding Officer or his designated representative for hazardous substance spills which occur on the Air Station.

g. The Officer In Charge (OIC) of MWSS-271 Aviation Crash Fire Rescue at MCALF Bogue shall:

(1) Provide initial emergency response on all reported oil spills which occur at MCALF Bogue when in his or her judgement a response by CFR at Bogue is required and serve as OSCDR until the spill is contained and the situation stabilized as detailed in (2) below.

(2) Determine when to turn the OSCDR responsibilities over to the FMO Spill Response Team for cleanup operations. The MWSS-271 OIC shall not relinquish control as OSCDR if the oil spill requires self-contained breathing apparatus and/or encapsulated suites. Under these conditions, the OIC will retain OSCDR responsibilities until the requirement for specialized PPE is downgraded. The Naval Hospital, Industrial Hygiene Division shall assist in determining when the site/event is safe for the FMO Spill Response Team to begin cleanup operations, when requested by the CFR at Bogue OIC.

(3) Brief the Air Station Chief of Staff, the Director of Facilities, or the duty officer on spill impacts after arriving on scene.

(4) Ensure all personnel responding to emergency oil or hazardous substance spills have appropriate equipment and spill response training in accordance with reference (b) and enclosure (3).

(5) Notify the EAO of all reported spills during both duty and non-duty hours as follows:

(1) Notify EAD as soon as possible of all spills reported during normal working hours (0700 to 1645, Monday through Friday).

(2) After normal working hours, all hazardous substance spills, all oil spills into the environment(on the land surface, into a drain, into the air, or into surface waters) or which pose an immediate threat to the environment or oil spills of five gallons or greater on impervious surface shall be reported to the EAO as soon as practicable utilizing the existing call back roster.

(3) Oil spills less than five gallons on impervious surfaces and which are reported after regular working hours shall be reported to EAD the following work day between the hours of 0730 and 0900.

(6) Maintain a current roster of CSOT personnel for recall during both duty and non-duty hours.

h. The following activities constitute the OSOT and shall provide assistance to the appropriate OSCDR:

(1) The Air Station Fire Division shall assist CFR at MCALF Bogue with emergency response to oil spills when requested.

(2) MWSS-271 Crash, Fire, and Rescue at MCALF Bogue shall assist the FD with emergency response to oil spills when requested.

(4) The FMO shall:

(a) Maintain trained personnel to assume the duties of OSCDR upon turnover from the FD Chief and the OIC CFR at MCALF Bogue. The FD Chief, the MCALF Bogue OIC or their designee has sole responsibility to determine when the cleanup operation can be turned over to the FMO.

(b) Report the progress of spill response to the Air Station Chief of Staff, Director of Facilities, or duty officer after assuming the duties of the OSCDR. Receive updates from the NAVAVNDEPOT Commanding Officer or his designated representative (for spills which occur within the NAVAVDEPOT) and forward this information to the Air Station Chief of Staff, Director of Facilities, or duty officer.

(c) Provide storage and transportation of waste products generated from the spill or from cleanup efforts using permitted storage facilities aboard the Air Station.

(d) Perform inspections of all booms, weirs, and spill gates in the Air Station drainage system at least three times per week (Monday, Wednesday, and Friday). Maintain these systems to ensure that they will perform their intended functions.

(e) Maintain a inventory of spill cleanup and mitigation supplies. Provide the FD and CFR at MCALF Bogue with equipment and supplies necssary to maintain a spill response vehicle.

(f) Equip and support a Spill Response Team consisting of FMD employees to provide emergency spill response for the Air Station and outlying fields. This team shall have sufficient expertise, personnel, training, equipment and supplies to respond and clean up oil and hazardous substance spills.

(g) Maintain a recall roster of the Spill Response Team with the FD and CFR at Bogue, which shall include name, job title, recall/notification priority, home address, and phone number.

(h) Train the Spill Response Team in accordance with reference (b) for emergency responses to oil and hazardous substance spills using enclosure (3) as a guide.

(i) Publish a rotation schedule for the commanding officers, listed in paragraph 6.d.(2), who are responsible for providing personnel detailed to the Spill Response Support Team. Notify commanding officers of this requirement two weeks ahead of duty schedule. Provide a copy of the schedule to the 2nd Marine Aircraft Wing Environmental Officer via the chain of command.

(j) Maintain a recall roster of the Spill Response Support Team which shall include: name, rank, and work/home address and phone number. Provide a copy of the roster to the 2nd Marine Aircraft Wing Environmental Officer via the chain of command.

(k) Train the Spill Response Support Team, with the cooperation of the EAD, in accordance with reference (b) for oil spill cleanup.

(l) Activate the Spill Response Support Team only when the squadron/department and FMD spill response assets have been exhausted. To activate the Spill Response Support Team, the FMO shall notify the unit commanding officer and the 2d Marine Aircraft Wing Environmental Officer for clean up of oil spills. The FMO shall supervise the response personnel during the spill cleanup.

(M) Provide members of the Spill Response Team to deploy and recover equipment from spill response boats during open water spill response operations.

(n) Request assistance, if required, from the NAVAVNDEPOT Commanding Officer or his designated alternative for hazardous substance spills which occur on the Air Station.

(5) The Spill Response Support Team shall:

(a) Consist of a five-person detail including one NCOIC, sergeant or above, and four lance corporals or below. Each group shall rotate on a monthly basis, be on call twenty-four hours a day, seven days a week, and not be granted leave, except for emergency purposes, during the term of the detail.

(b) Receive training for oil spill clean up, in accordance with reference (b), from FMD and EAD prior to the assignment.

(c) Provide the FMO a roster of personnel assigned to the detail and to be used by the OSCDR'S, if needed. The roster shall include: name, rank, and work/home address and phone number.

(d) Assemble at FMD, within one-half hour upon activation by the OSCDR, unless otherwise notified.

(e) Be used to clean up oil spills only. The Spill Response Support Team will not be provided training necessary to perform hazardous substance spill response.

(f) Not be used by the NAVAVNDEPOT since that command has an in-house system for spill response.

(5) The Commanding Officer of the NAVAVNDEPOT or designated alternate shall:

(a) Maintain trained personnel to assume the duties of OSCDR upon turnover from the Air Station Fire Chief. The Air Station Fire Chief or his designee has sole responsibility to determine when the cleanup operation can be turned over to the NAVAVNDEPOT Spill Response Team.

(b) Request assistance, if required, from the FMO and provide updates of the spill cleanup measures to the FMO, who will forward this information to the Air Station Chief of Staff, the Director of Facilities, or the duty officer.

(c) Provide storage and transportation of waste products generated from the spill or from cleanup efforts.

(d) Maintain a recall roster of the NAVAVNDEPOT Spill Response Team with the Air Station Fire Division which shall include: name, job title, recall/notification priority, home address, and phone number.

(e) Train the NAVAVNDEPOT Spill Response Team in accordance with reference (b) for emergency response to oil and hazardous material spills using enclosure (3) as a guide.

(f) Provide the NAVAVDEPOT Spill Response Team to assist with hazardous substances spills on the Air Station, Airfield or Outlying Fields when requested by the Air Station Fire Chief or by the FMO.

(6) The EAO shall:

(a) Provide technical liaisons to the OSCDR'S, evaluating environmental impacts and applicability of federal and state regulations.

(b) Provide official liaison between the OSCDR'S and Air Station commands.

(c) Provide technical expertise on response actions.

(d) Maintain the oil and hazardous substance management plan.

(e) Enforce regulations on all spills of oil and hazardous substances and related environmental problems as regulated by federal, state, and local authorities.

(f) Provide administrative and technical support related to provisions of this Order.

(g) Coordinate debrief meetings for spill responses which are deemed serious or to which response was inadequate within ten working days of the spill. Debriefs shall include the responsible squadron/department, the OSCDR and OSOT participating in the response, and any outside agencies involved. Debrief shall focus on improvement of Air Station spill response procedures and discuss methods for eliminating future similar spills.

(h) Utilize existing General Air Station maps to locate drainage ways showing spill control point locations. Conduct random monitoring of these points.

(i) Maintain a recall roster with the FD, CFR and CFR at Bogue which shall include: name, job title, recall/notification priority, home address, and phone number.

(j) Train EAD personnel in accordance with reference (b) for emergency response to oil and hazardous substance spills using enclosure (3) as a guide.

(k) Fund initial and annual refresher training for the following members of the OSOT: EAD; FMD; DSS; and Naval Hospital, Industrial Hygiene Department.

(l) Perform inspections of all booms, weirs, and spill gates in the Air Station's drainage system at least twice per week (Tuesday and Thursday). Telephonically report any observed maintenance requirements to the FMO.

(m) Report spills to the Commandant of the Marine Corps as required by reference (f).

(n) Report spills to appropriate federal and state agencies as required by references (a) through (e) using the guidelines listed below.

1 Oil and hazardous substance spills or discharges into or upon any waters, tidal flats, beaches, or lands or into any sewer, surface water drain, or other waters that drain into the waters on or surrounding the Air Station or outlying fields. Spills of oil or hazardous substances on water which cause a visible surface sheen or staining of shorelines shall be reported.

2 Any spill of oil or hazardous substance greater than or equal to the "reportable quantity" as listed in 40 CFR 302 within 24 hours of the spill. The EAO shall maintain a current listing of these substances.

3 Any oil or hazardous substance spill which due to fire, explosion, or other inherent chemical hazard could require evacuation of surrounding areas.

4 Any spill to the environment from any hazardous waste treatment, storage, or disposal facility within 24 hours of its detection.

5 Any transportation-related incidents (including loading, unloading, and temporary storage) in which, due to a hazardous substance, the following occur: a person is killed or receives injuries requiring hospitalization; estimated carrier or property damage exceeds $50,000.00; fire, breakage, spillage, or a suspected spill of radioactive or etiologic agents occurs; a situation exists of such a nature that, in the judgment of the carrier, it should be reported even though it does not meet the above criteria.

(o) Review and approve all unit Spill Contingency Plans as identified in 6.e.(4)

(p) Provide funding to maintain spill response boats controlled by the Aerial Surface Targets Department and the Air Station Fire Department.

(q) Provide training and exercises on the Air Station's Integrated Facility Response Plan as required by federal law.

(7) The DSS shall:

(a) Provide gas-free engineering, safety guidance, and recommend other work procedures required to comply with OSHA and Department of Defense (DoD) guidance for worker protection and hazard communication.

(b) Conduct random simulations to test the adequacy of the units Spill Contingency Plan. A written critique of the simulation shall be performed by the DSS and forwarded to the unit EC through the chain of command and the EAO for review. The DSS shall conduct a minimum of four simulations from selected units each calendar year.

(c) Maintain records of the annual simulations of the previous year for scheduling purposes.

(d) Maintain a recall roster with the FD, CFR and CFR at MCALF Bogue which shall include: name, job title, recall/notification priority, home address, and phone number.

(e) Train personnel, in accordance with reference (b) for emergency response to oil and hazardous substance spills using enclosure (3) as a guide.

(f) Advise the OSCDR's, when requested, on appropriate/required PPE necessary to entry the oil or hazardous substance spill.

(8) The Naval Hospital, Industrial Hygiene Department shall:

(a) Provide permissible exposure limits according to the National Institute of Safety and Health, OSHA, and DoD directives to the OSCDR'S for selection of PPE, when requested by the OSCDR. Provide on-site monitoring to determine exposure risks according to established exposure standards.

(b) Maintain a recall roster with the FD, CFR, and CFR at MCALF Bogue which shall include: name, job title, recall/notification priority, home address, and phone number.

(9) The Master Chief Petty Officer, Utility Boats Division shall:

(a) Train Utility Boats Division personnel in proper boom and skimmer deployment procedures for oil spill containment in open waters (i.e., Slocum/Hancock Creeks and the Neuse River). Train Utility Boats Division personnel in the storage and maintenance of containment booms.

(b) Routinely assist FMD Spill Response Team in deployment and retrieval of booms during oil transfers.

(c) Provide operational control, crews, maintenance and storage for the following spill response boats.

<u>1</u> 28' Kvichak Oil Skimmer.

2 30' Sea Ark Boom Barge.

(d) Provide preventative maintenance and personnel to operate the boats above.

(e) Provide preventative maintenance and personnel to operate the two (21' Sea Ark Runabout and a 28' Sea Ark Boom Barge) spill response boats controlled by the Air Station Fire Department, when requested by the Fire Chief

.

(f) Only operate the boats identified in (c) above during open water spill response operations and with the concurrence of the EAO. A member of the OSOT experienced in open water spill response shall be aboard the boats identified in (2) above during operation.

(g) Train personnel in accordance with reference (b) for emergency response to oil and hazardous substances spills using enclosure (3) as a guide.

(10) The Provost Marshal shall :

(a) Control perimeter security to the spill site as requested by the OSCDR'S to assure the safety of the public and OSOT.

(b) Train personnel in accordance with reference (b) for oil and hazardous substances emergency spill response using enclosure (5) as a guide.

h. The Director of Training/Education shall schedule the training courses outlined in enclosure (3) as required by OSHA and RCRA.

h. The Director of Operations shall, prior to approval of training exercises at outlying fields or BT-11, require each squadron/department to submit a exercise-specific spill contingency plan in accordance with reference (i). The spill contingency plan shall list the equipment/resource the squadron/department will utilize and detail spill response procedures, including the disposal of recovered/contaminated media. The spill contingency plans shall be consistent with this Order.

i. The Motor Transportation Officer shall provide vehicles and equipment as required to tow spill response boats and to support the OSCDR'S.

7. <u>Guidelines for Activating NAVSEA and Contractor Support</u>. In the event of a spill involving any condition listed below, the OSCDR'S can activate outside assistance through various support channels in accordance with references (c), (d), (e), and (j). POC for activating NAVSEA (Arlington Virginia) assistance is Paul Hankins at: (703) 607-2758. Other contract support can be aquired through Facility Support Contracts (FSC). POC for FSC is Linda Dowling at: 466-4190.

a. The spill is in open water such as Slocum Creek, Handcock Creek, the Neuse River or Pamilco Sound.

b. The Air Station does not have manpower or equipment required to manage the spill.

c. Severe weather or other factors make the spill beyond the capabilities of the Air Station response team.

8. <u>Securing Oil or Hazardous Substance Spills</u>

a. The OSCDR shall ensure that contaminated areas, personnel, and equipment are thoroughly decontaminated before securing the OSOT.

b. The OSCDR will provide final notification to the Air Station Chief of Staff, the Director of Facilities, or the duty officer when response actions are secured.

c. The squadron/department responsible for the spill will dispose of all spill residues according to reference (h). When there is not a specific responsible squadron/department, the FMO shall provide proper disposal. The squadron/department responsible for the spill shall complete a spill report using enclosure (4) and forward it within five working days the EAO.

9. <u>Violation</u>. The intentional discharge or negligent release of any oil or hazardous substance into the environment is a violation of this Order. The CG, MCAS Cherry Point, as well as individuals, may be held personally liable for violations of environmental laws. Individuals responsible for violations of this Order may be subject to civil and/or criminal penalties of up to $50,000.00 per day and/or jail sentences.

10. <u>Records Disposition Instruction</u>. Records pertaining to any spill incident, such as forms, reports, correspondence, etc., shall be maintained for 3 years. Records may be destroyed after 3 years.

11. <u>Forms Availability</u>. The form shown in enclosure (10) may be reproduced locally. On request, this form can be obtained through E-mail from the EAO.

12. <u>Concurrence</u>. The CG, 2d Marine Aircraft Wing; the Commanding Officers, Naval Aviation Depot and Combat Service Support Detachment-21; the Commanders, 12th Dental Company and Defense Distribution Depot; and the Chief, Defense Reutilization and Marketing Office concur with the contents of this order insofar as it pertains to members of their commands.

DISTRIBUTION: A-2

REPORTS REQUIRED

	REPORT TITLE	REPORT CONTROL SYMBOL	PARAGRAPH
I.	Initial Spill Report to the Air Station Fire Division	AS-5090-10	6c(1)
II.	Site-Specific Spill Contingency Plan	AS-5090-11	6e(4)
III.	Critique of Spill Scenerio	AS-5090-12	6e(7)
IV.	Spill Report for the EAD	AS-5090-13	6e(8)
V.	Air Station Fire Division Spill Report Log	AS-5090-14	6f(6)
VI.	Aviation Crash Fire Rescue Division Spill Report Log	AS-5090-15	6g(6)
VII.	Aviation Crash Fire Rescue at Bogue Field Spill Report Log	AS-5090-16	6h(6)
VIII.	FMD Spill Response Team Recall Roster	AS-5090-17	6g(4)(g)
IX.	Spill response Support Team Recall Roster	AS-5090-18	6i(4)(j)
X.	NAVAVNDEPOT Recall Roster	AS-5090-19	6i(5)(d)

XI.	EAD Recall Roster	AS-5090-20	6i(6)(i)
XII.	SSD Recall Roster	AS-5090-21	6i(7)(d)
XIII.	Naval Hospital, Industrial Hygiene Division Recall Roster	AS-5090-22	6i(8)(b)
XIV.	Training Exercise-Specific Contingency Plan	AS-5090-23	6i

SITE LOCATION MAP
MCAS CHERRY POINT, NORTH CAROLINA

ENCLOSURE (2)

UNIT NUMBER	UNIT NAME
1	Borrow Pit/Landfill
2	Borrow Pit/Landfill
3	EOD Range
4	Borrow Pit/Landfill North of Runway 14
5	Storage Tank
6	Fly Ash Ponds
7	Old Incinerator and Adjacent Area
10	Old Sanitary Landfill
15	Area and Ditch Behind NAVAVNDEPOT
16	Landfill at Sandy Branch
17	DRMO Storage Area
19	Borrow Pit/Landfill
21	Borrow Pit/Landfill
38	DRMO Hazardous Waste Storage Facility
39	FMD/Hazardous Waste Storage
40	NAVAVNDEPOT Former Drum Storage Area
41	Fuel Line Leak Site
42	Industrial Wastewater Treatment Plant
43	Sewage Treatment Plan
44	Former Sludge Application Area
45	Current Sludge Application Area
46	Polishing Ponds 1 and 2
47	Drainage System
49	Oil/Water Separators and Leachfields
50	PCB Transformer Spill

SPILL RESPONSE TRAINING REQUIREMENTS

Description of Level of Spill Response

First Responder at Awareness Level. (PMO) Individuals who are likely to witness or discover a hazardous material spill and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the spill. They would then take no further action. An individual from PMO, for example, discovering an overturned vehicle containing hazardous substances, would fall under this classification.

First Responder at Operations Level (EC, URP and Utility Boat Division). Individuals who respond to spills or potential spills of hazardous substances as part of the initial response to the site for the purpose of protecting nearby people and property. They are trained to respond in a defensive fashion without actually trying to stop the spill. Their function is to contain the spill from a safe distance, prevent it from spreading, and prevent additional exposures.

Hazardous Materials Technicians (Air Station Fire Division, MWSS-271 at MCALF Bogue, FMD and NAVAVNDEPOT Spill Response Teams). Individuals who respond to a spill for the purpose of stopping the spill. They assume a more aggressive role than a first responder at the operations level, in that they will approach the point of the spill in order to plug, patch, or otherwise stop the spill of a hazardous substance.

Hazardous Material Specialists (remaining OSOT members). Individuals who respond with and provide support to the Air Station Fire Division, MWSS-271 at MCALF Bogue, FMD, and NAVAVNDEPOT Spill Response Teams. Their duties require knowledge of specialized fields such as PPE, environmental protection, confined space entry, etc. The specialist also acts as the liaison with federal, state, local, and other government authorities in regard to response activities.

OSCDR. The OSCDR's are the officials designated by the CG ~~assumes~~ control of an incident scene beyond the first responder awareness level. All emergency responders and their communications should be coordinated and controlled through this individual.

29 CFR 1910.120 Requirements for Emergency Response Organizations

Worker	Initial Training	Annual "Refresher"
First responder awareness level	Competency	Demonstration of competency
First responder operations level	8 hours	Demonstration of competency
Hazardous materials technician	At least 24 hours	Demonstration of competency
Hazardous materials specialist	At least 2[illegible] hours	Demonstration of competency
OSCDR	At least 24 hours	Demonstration of competency

ENCLOSURE (3)

SPILL REPORT
for Environmental Affairs Department

Reporting spill: Unit: __________ Person: __________ Phone No.: __________	Date/time of spill: Date/time cleanup began:
Unit responsible for spill:	Date/time cleanup completed:
Material spilled:	Amount spilled:
Spill location (Bldg., pit, structure, etc.):	Type of surface spill was on: Water ____ Asphalt ____ Grass ____ Gravel ____ Soil ____ Concrete ____ Other __________
Spill enter a drainage system? yes ______ no ______	
Procedure to eliminate spill: Shutoff pumps ______ Close valves ______ Overpack container ______ Upright container ______ Nothing available ______ Other ______	Caused by: Equipment failure ______ Human error ______ Other ______ Is this a reoccurring problem? yes ______ no ______
Notification: (Check each notified) Fire Division (2241/3333) ____ Crash Crew (2420) ____ FMD (4363) ____ EAD (4591) ____ Unit Duty Officer (after hrs) ____ Industrial Hygienist (3833) ____ Joint Safety Office (2730) ____	Name of OSCDR: Section Leader's signature Supervisor's signature
Additional comments from the reporting activity: __________	

EAD Person Receiving Call: ____________________

EAD Spill Log Number: __________

ENCLOSURE (4)

FOR EAD USE ONLY

<table>
<tr><td>CERCLA HS: ______ (Over RQ) ______
EPCRA EHS: ______ ______
Spill near UST/AGST: ______</td><td>Date/time of notification:</td></tr>
<tr><td>Tank Manager:</td><td rowspan="2">Agency notified:
NRC ______
SERC ______
LEPC ______
State
Raleigh ______
Washington ______
Wilmington ______
EPA ______
Other ______</td></tr>
<tr><td>EPCRA Manager:</td></tr>
<tr><td colspan="2">Additional comments from EAD: ______

EAD Responder's Signature ______</td></tr>
<tr><td colspan="2">Spill Response Debrief Meeting</td></tr>
<tr><td>Date/Time of Meeting:</td><td>Location of meeting:</td></tr>
<tr><td colspan="2">Attending meeting members:
EAD ______
Fire Division ______
FMD ______
Industrial Hygiene ______
Joint Safety Department ______
NAVAVNDEPOT Representative ______
Wing Representative ______
Other ______</td></tr>
</table>

Attach a MSDS on all chemical spills.
Attach supporting letters and documentation associated with spill.

ENCLOSURE (4)

EMERGENCY NOTIFICATION AND ACTIONS
DISCOVERER/SPILLER

ANY INDIVIDUAL CAUSING OR DISCOVERING AN OIL OR HAZARDOUS SUBSTANCE SPILL OR A SITUATION THAT MAY LEAD TO A SPILL OF OIL OR HAZARDOUS SUBSTANCES, SHALL IMMEDIATELY TAKE THE FOLLOWING ACTION. THE SEQUENCE WILL DEPEND ON EXISTING CONDITIONS.

EVACUATE area to a safe distance upwind and upgrade from the hazardous substance spill.

PASS THE WORD to people in adjacent spaces.

INFORM your supervisor or the supervisor of the nearest facility.

REPORT spill immediately to

FIRE DIVISION 466-3333/2241
CRASH FIRE RESCUE 466-2420

WHENEVER POSSIBLE give the following information, if known, or that which can reasonably be determined. **DO NOT** wait until **ALL** information on the spill is available.

- Your name and telephone number
- Location of the spill (Building Number or Shop Code)
- Number and type of injuries
- Identify the type and estimate amount of spilled material
- Source of spill (e.g., tank or container)
- Behavior or spilled material (e.g., reactions, leak, spill, or fire observed)
- Anticipated movement of spill and actions being taken
- Time when the spill occurred

DO NOT allow unauthorized persons to enter the spill area.

RESTRICT all sources of ignition: smoking, internal combustion engines, or open flames.

WAIT for the OSCDR to arrive and direct them to the spill.

PROVIDE information and assistance as instructed.

SECONDARY CONTAINMENT STRUCTURE
INSPECTION AND MAINTENANCE RECORD

1. Inspector's Name/Phone Number: ______________________________
2. Date of Inspection: ______________________________
3. Building/Structure Number: ______________________________
4. Unit/Responsible Activity: ______________________________
5. Location: ______________________________
6. Required inspection items (Check each item):
   - a. Gate valve closed ____
   - b. Drainage valve locked in closed position ____
   - c. Condition of valve components (handwheels, seals, lubrication) ____
   - d. Water in containment area ____
   - e. Evidence of spills (surface sheens, odors, stains) ____
   - f. Cracks through containment curbs/foundation pads ____
   - g. Structural integrity (rusting, spalling) ____
   - h. Condition of finish coats ____

   Notes: ______________________________
   ____
   ____
   ____
7. Maintenance action, Work Ticket number and date requested (indicate "none" if applicable):
   ____
   ____
8. Maintenance action and date performed (indicate "none" if applicable): ______________________________
   ____
   ____
9. Notes: ______________________________
   ____
   ____
   ____

NOTE: A copy of the completed form shall be filed by the inspecting command and the completed original shall be submitted to the Environmental Affairs Department, Building 4223 by the fifteenth of following month.

APPENDIX C

EROSION AND SEDIMENT CONTROL PLAN

EROSION AND SEDIMENT CONTROL PLAN FOR REMEDIATION OF CONTAMINATED SOIL OPERABLE UNIT 2, SITE 10 MCAS CHERRY POINT, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Atlantic Division
Naval Facilities Engineering Command
6500 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, VA 23508

Prepared by:

OHM Remediation Services Corp.
5445 Triangle Parkway, Suite 400
Norcross, GA 30092

Reviewed by:

Steven Bivone
Project Manager

John P. Franz, P.E.
Program Manager

September 1997
Delivery Order 0080
OHM Project No. 17488

OHM Remediation Services Corp.

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1.0 INTRODUCTION

The Department of the Navy, Atlantic Division, Naval Facilities Engineering Command, has requested OHM Remediation Services Corp. (OHM) to provide a soil vapor extraction system at Operable Unit No. 2 (OU-2) Site 10, at Marine Corps Air Station (MCAS), Cherry Point, North Carolina, complete and ready for use. The preconstruction deliverables include preparation of an Erosion and Sedimentation Control Plan in accordance with the Erosion and Sediment Control Planning and Design Manual, North Carolina Sediment Control Commission, December 1, 1993.

2.0 PROJECT OBJECTIVE AND SCOPE OF WORK

The remedial objective of the project is to address the contaminated soil in four hotspots at Operable Unit 02, Site 10 located on the Marine Corps Air Station (MCAS), Cherry Point, North Carolina. Environmental investigations have shown that the soil is contaminated with VOCs. The major constituents are chlorinated hydrocarbons and their decomposition products. The selected remedy is a soil vapor extraction system to remove volatile organic compounds (VOCs) vapors from the soil present in four hotspots.

The remedial system scope of work involves the following components:

- Soil vapor extraction well installation
- Wellhead and trench construction
- Utility construction
- Treatment equipment installation
- Fence installation
- Site restoration

OHM will operate and maintain the system for one year after system start-up.

3.0 CONSTRUCTION SITE DESCRIPTION

The Marine Corps Air Station (MCAS), Cherry Point is a military installation located north of the town of Havelock in southeastern Craven County, North Carolina. The air station covers over 11,000 acres. MCAS, Cherry Point boundaries are the Neuse River to the North, Hancock Creek to the East, North Carolina Highway 101 to the south, and a boundary line approximately 3/4 mile west of Slocum Creek. The entire facility is located on a peninsula north of Core and Bogue Sounds and south of the Neuse River.

OU2 is located in the west/central portion of the air station. OU2 is bounded by the Sewage Treatment Plant (STP) to the north, Roosevelt Boulevard to the east, a residential area to the south, and Slocum Creek to the west. OU2 consists primarily of the Site 10 Landfill. It also includes the polishing ponds (Site 46) north of the landfill, a former sludge application area (Site 44A formerly Site 45) located in the north-central portion of OU2, and the vehicle maintenance area (Hobby Shop) (Site 76) located southwest of the landfill. The construction sites involve the installation of extraction wells, gathering lines, and equipment compound site. Land use in the vicinity is industrial with buildings, utilities, and asphalt roads. The soil description from the surface to groundwater at the construction sites is fine to medium sand with silty to clayey sand interbeds.

4.0 PLANNED EROSION SEDIMENT CONTROL

Prior to disturbance of vegetation and soil, temporary erosion / sediment control will be established on the down gradient side of each excavation. Control techniques to be utilized will involve sediment fencing (silt fencing). Silt fencing will be installed with the fabric a minimum of 6 inches below grade and extending 36 inches above grade and fastened to posts no more that 6 feet apart. The posts will be installed with a minimum of 24 inches below grade and extend a minimum of 36 inches above grade. fabric will be attached to the up-slope side of the posts using 1-inch staples or tie wires. Silt fences will be inspected after every rain and daily during extended rain fall. Inspections will be documented according to the Contractor Quality Control Plan found in Appendix D of this Work Plan. Accumulated sediment will be removed before the depth reaches 12 inches. Open excavations or stockpiled soil vulnerable to creating erosion problems during construction activities will be held to a minimum. Appendix A contains the Practice Standards and Specifications for Sediment Fence (Silt Fence) drawn from Erosion and Sediment Control Planning and Design Manual, North Carolina Sediment Control Commission, December 1, 1993. Certification of the filter fabric for conformance to the same specifications as previously approved under Navy Technical Representative's past project (OU-1, Site 16) unless otherwise directed.

5.0 CONSTRUCTION SCHEDULE AND MAINTENANCE ACTIVITIES

The following steps list the construction schedule and maintenance activities for the Erosion and Sediment Control Plan:

1. Obtain plan approval and other applicable permits.

2. Hold preconstruction conference at least one week prior to starting construction.

3. Flag work limits and create buffer area for protection.

4. Install silt fences at the treatment facility location, along the pipeline route, and at the recovery well locations.

5. Clear debris from site and start excavation and removal of soil.

6. Back-fill excavations with uncontaminated soil or borrow material.

7. Identify any areas or locations that require additional erosion control devices.

8. All erosion and sediment control practices will be inspected daily and after rainfall events. Accumulated sediment will be removed before the depth reaches 12 inches. Needed repairs will be made immediately.

9. After site is stabilized all erosion and sediment control structures may be removed.

10. After completion of the field construction activities the disturbed areas will be seeded. Prior to seeding and fertilization, lime will be applied as a soil amendment for pH adjustment at a rate of approximately 40 pound per acre. Any trees or other landscape features will be restored, if practical, by trimming of damaged limbs and application of tree dressing. Soil will be placed and compacted around root systems exposed during excavation activities.

The erosion and sediment controls will remain in place approximately three to six months, depending on the construction activity.

6.0 FINANCIAL RESPONSIBILITY/OWNERSHIP FORM

A completed Financial Responsibility/Ownership Form can be found in Appendix B.

APPENDIX A

PRACTICE STANDARDS AND SPECIFICATIONS, SEDIMENT FENCE (SILT FENCE), EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL, NORTH CAROLINA SEDIMENT CONTROL COMMISSION, DECEMBER 1, 1993

6.62 SEDIMENT FENCE (SILT FENCE)

Definition

A temporary sediment barrier consisting of filter fabric buried at the bottom, stretched, and supported by posts.

Purpose

To retain sediment from small disturbed areas by reducing the velocity of sheet flows to allow sediment deposition.

Conditions Where Practice Applies

Below small disturbed areas less than 1/4 acre per 100 ft of fence.

Where runoff can be stored behind the sediment fence without damaging the fence or the submerged area behind the fence.

Do not install sediment fences across streams, ditches, or waterways.

Planning Considerations

A sediment fence is a permeable barrier that should be planned as a system to retain sediment on the construction site. The fence retains sediment primarily by retarding flow and promoting deposition. In operation, generally the fence becomes clogged with fine particles, which reduce flow rate. This causes a pond to develop more quickly behind the fence. The designer should anticipate ponding and provide sufficient storage areas and overflow outlets to prevent flows from overtopping the fence. Since sediment fences are not designed to withstand high heads, locate them so that only shallow pools can form. Tie the ends of a sediment fence into the landscape to prevent flow around the end of the fence before the pool reaches design level. Provide stabilized outlets to protect the fence system and release stormflows that exceed the design storm.

Deposition occurs as the storage pool forms behind the fence. The designer can direct flows to specified deposition areas through appropriate positioning of the fence or by providing an excavated area behind the fence. Plan deposition areas at accessible points to promote routine cleanout and maintenance. Show deposition areas in the erosion and sedimentation control plan. A sediment fence acts as a diversion if placed slightly off the contour. This may be used by the designer to control shallow, uniform flows from small disturbed areas and to deliver sediment-laden water to deposition areas.

Sediment fences serve no function along ridges or near drainage divides where there is little movement of water. Confining or diverting runoff unnecessarily with a sediment fence may create erosion and sedimentation problems that would not otherwise occur.

Design Criteria

Ensure that the drainage area is no greater than 1/4 acre per 100 ft of fence.

Make the fence stable for the 10-yr peak storm runoff.

Where all runoff is to be stored behind the fence, ensure that the maximum slope length behind a sediment fence does not exceed the specifications shown in Table 6.62a.

Ensure that the depth of impounded water does not exceed 1.5 ft at any point along the fence.

If nonerosive outlets are provided, slope length may be increased beyond that shown in Table 6.62a, but runoff from the area should be determined and bypass capacity and erosion potential along the fence must be checked. The velocity of the flow at the outlet or along the fence should be in keeping with Table 8.05d, *Appendix 8.05*.

Table 6.62a
Maximum Slope Length and Slope for which Sediment Fence is Applicable

Slope	Slope Length (ft)
< 2%	100
2 to 5%	75
5 to 10%	50
10 to 20%	25
>20%	15

Provide a riprap splash pad or other outlet protection device for any point where flow may overtop the sediment fence, such as natural depressions or swales. Ensure that the maximum height of the fence at a protected, reinforced outlet does not exceed 1 ft and that support post spacing does not exceed 4 ft.

The design life of a synthetic sediment fence should be 6 months. Burlap is only acceptable for periods up to 60 days.

Construction Specifications

MATERIALS

1. Use a synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn, which is certified by the manufacturer or supplier as conforming to the requirements shown in Table 6.62b.

Synthetic filter fabric should contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 to 120° F.

2. Ensure that posts for sediment fences are either 4-inch diameter pine, 2-inch diameter oak, or 1.33 lb/linear ft steel with a minimum length of 4 ft. Make sure that steel posts have projections to facilitate fastening the fabric.

3. For reinforcement of standard strength filter fabric, use wire fence with a minimum 14 gauge and a maximum mesh spacing of 6 inches.

Table 6.62b
Specifications For Sediment Fence Fabric

Physical Property	Requirements
Filtering Efficiency	85% (min)
Tensile Strength at 20% (max.) Elongation	Standard Strength- 30 lb/lin in (min) Extra Strength- 50 lb/lin in (min)
Slurry Flow Rate	0.3 gal/sq ft/min (min)

CONSTRUCTION

1. Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.

2. Ensure that the height of the sediment fence does not exceed 18 inches above the ground surface. (Higher fences may impound volumes of water sufficient to cause failure of the structure.)

3. Construct the filter fabric from a continuous roll cut to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with overlap to the next post.

4. Support standard strength filter fabric by wire mesh fastened securely to the upslope side of the posts using heavy duty wire staples at least 1 inch long, or tie wires. Extend the wire mesh support to the bottom of the trench.

5. When a wire mesh support fence is used, space posts a maximum of 8 ft apart. Support posts should be driven securely into the ground to a minimum of 18 inches.

6. Extra strength filter fabric with 6-ft post spacing does not require wire mesh support fence. Staple or wire the filter fabric directly to posts.

7. Excavate a trench approximately 4 inches wide and 8 inches deep along the proposed line of posts and upslope from the barrier (Figure 6.62a).

8. Backfill the trench with compacted soil or gravel placed over the filter fabric.

9. Do not attach filter fabric to existing trees.

Maintenance

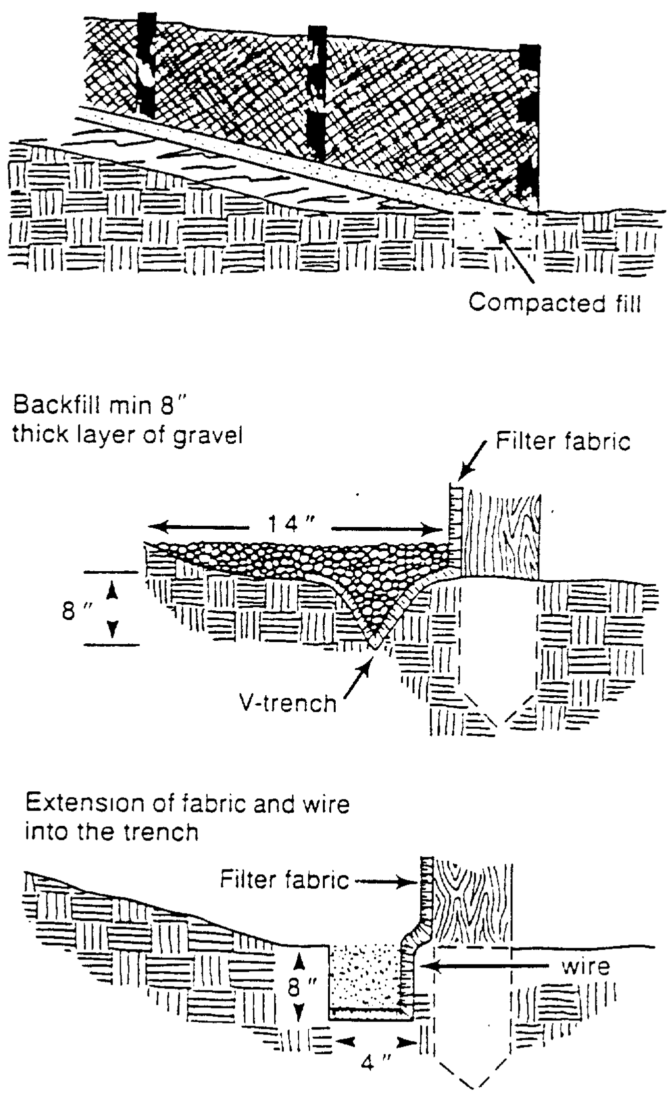
Inspect sediment fences at least once a week and after each rainfall. Make any required repairs immediately.

Should the fabric of a sediment fence collapse, tear, decompose or become ineffective, replace it promptly. Replace burlap every 60 days.

Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.

Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

Figure 6.62a Installation detail of a sediment fence.



References

Runoff Control Measures
6.20, Temporary Diversions

Outlet Protection
6.41, Outlet Stabilization Structure

Sediment Traps and Barriers
6.60, Temporary Sediment Trap
6.61, Sediment Basin

Appendix
8.03, Estimating Runoff

APPENDIX B

COMPLETED FINANCIAL RESPONSIBILITY/ OWNERSHIP FORM

FINANCIAL RESPONSIBILITY/OWNERSHIP FORM
SEDIMENTATION POLLUTION CONTROL ACT

No person may initiate any land-disturbing activity on one or more contiguous acres as covered by the Act before this form and an acceptable erosion and sedimentation control plan haved been completed and approved by the Land Quality Section, N.C. Department of Environment, Health and Natural Resources. (Please type or print and, if question is not applicable, place N/A in the blank.)

Part A.

1. Project Name______________________________

2. Location of land-disturbing activity: County______________________________, City or Township______________________________, and Highway / Street______________________________

3. Approximate date land-disturbing activity will be commenced:______________________________

4. Purpose of development (residential, commercial, industrial, etc.) :______________________________

____

5. Approximate acreage of land to be disturbed or uncovered : ______________________________

6. Has an erosion and sedimentation control plan been filed ?Yes____xx____ No __________

7. Person to contact should sediment control issues arise during land-disturbing activity.

Name______________________________ Telephone______________________________

8. Landowner (s) of Record (Use blank page to list additional owners.):

______________________________ ______________________________

Name (s)

______________________________ ______________________________

Current Mailing Address Current Street Address

______________________________ ______________________________

City State Zip City State Zip

9. Recorded in Deed Book No. __________________ Page No.__________________

Part B.

1. Person (s) or firms (s) who are financially responsible for this land-disturbing activity (Use the blank page to list additional persons or firms):

______________________________ ______________________________

Name of Person (s)or Firm (s)

______________________________ ______________________________

Mailing Address Street Address

______________________________ ______________________________

City State Zip City State Zip

Telephone ______________________________ Telephone______________________________

2. (a) If the Financially Responsible Party is a Corporation give name and street address of the Registered Agent.

Name

Mailing Address | Street Address

City State Zip | City State Zip

Telephone | Telephone

(b) If the Financially Responsible Party is a Partnership give the name and street address of each General Partner (Use blank page to list additional partners.):

Name

Mailing Address | Street Address

City State Zip | City State Zip

Telephone | Telephone

The above information is true and correct to the best of my knowledge and belief and was provided by me under oath. (This form must be signed by the financially responsible person if an individual or his attorney-in-fact or if not an individual by an officer, director, partner, or registered agent with authority to execute instruments for the finanacially responsible person). I agree to provide corrected information should there be any change in the information provided herein.

Type or print name | Title or Authority

Signature | Date

I, ______________________________, a Notary Public of the County of ______________

State of North Carolina, hereby certify that ______________________________ appeared personally before me this day and being duly sworn acknowledged that the above form was executed by him.

Witness my hand and notarial seal, this ____ day of ______________, 19______.

Seal

Notary

My commission expires______________

APPENDIX D

QUALITY CONTROL PLAN

QUALITY CONTROL PLAN
FOR
CONSTRUCTION AND OPERTION OF AIR SPARGING AND VAPOR EXTRCTION REMEDIAL SYSTEMS AT OPERBLE UNIT 02, SITE 10
MCAS CHERRY POINT, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0080

Prepared by

OHM Remediation Services Corp.
5445 Triangle Parkway, Suite 400
Norcross, GA 30092

Steven Bivone
Project Manager

for

John P. Franz, P.E.
Program Manager

September 1997
Delivery Order 0080
OHM Project No. 17488

OHM Remediation Services Corp.

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1.0 STATEMENT OF QC PROGRAM

OHM Remediation Services Corp. (OHM), a subsidiary of OHM Corporation, will provide and maintain an effective Contractor Quality Control (CQC) Program as required by contract clauses. This program will be performed in conjunction with the Program Quality Control Plan (OHM, December 14, 1995) as applicable and in accordance with the requirements of Contract No. N62470-93-D-3032, Atlantic Division, Naval Facilities Engineering Command, dated August 1993. OHM will perform the inspection and test required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements. OHM will perform each test or inspection specified, unless the required inspection and/or test is specifically designated to be performed by the Government.

2.0 QC ORGANIZATION AND RESPONSIBILITIES

2.1 PROJECT BACKGROUND AND OBJECTIVES

The QC organization is depicted in the Organizational Chart (Exhibit 2.1). Other positions are reflected to show organizational interface and lines of communication. Depending upon the scope, size and complexity of the project, the Project Superintendent may also fulfill the duties of the Project QC Manager when approved by the Navy.

2.2 QC MANAGERS

The Program QC Manager's resume is included in the Program QC Plan and the QC Manager's resume (delivery order specific) is included herein as Exhibit 2.2.

2.3 DUTIES, RESPONSIBILITIES AND AUTHORITIES

1. The Program QC Manager shall report to the Program Manager and shall be responsible for developing, maintaining, and enforcing the quality control program.

2. The QC Manager shall report to the Program QC Manager and shall be responsible for the management and implementation of the Program QC Plan and the delivery order specific QC Plan for both on-and off-site activities. Specific duties include: attend the Coordination and Mutual Understanding Meeting; conduct the scheduled QC meetings; perform the three phases of control; perform submittal reviews; perform submittal approval except for submittals designated for Contracting Officer approval; ensure tests are performed; and prepare QC certifications and QC documentation as required by this Plan. Except for managing and implementing the QC program, the QC Manager shall perform no other duties without the authorization of the Contracting Officer. The QC Manager shall also be responsible for delivering the following documentation to the Contracting Officer:

   - Combined Contractor Production Report/Contractor Quality Control Report, original and one copy, by 10:00 a.m. the next working day after each day that work is performed.

   - Testing Plan and Log, three copies, at the end of each month.

   - Monthly Summary Report of Field Tests, original and two copies attached to the Contractor Quality Control Report at the end of each month. (See paragraph entitled "Test Results" in Section 4.0).

   - QC meeting minutes, three copies within two calendar days of the meeting.

   - Rework items list, three copies at the end of each month.

- Completion Certification attesting that "the work has been completed, inspected, tested, and is in compliance with the contract."

3. The QC Manager is expected to attend the daily site safety meetings and abide by all site rules and regulations.

2.4 APPOINTMENT LETTERS

The appointment letter for the site QC Manager is included as Exhibit 2.4. The appointment letter for the Program QC Manager can be found in the Program QC Plan.

3.0 SUBMITTALS

3.1 REVIEWING, APPROVING, AND MANAGING SUBMITTALS

A. Contractor's Responsibility

The following responsibilities are those of the contractor and not the QC organization. They are included only for the purpose of providing an understanding of the contractor's responsibility. While the QC organization is expected to assist the contractor in fulfillment of their responsibilities, no part of these responsibilities shall be assumed by the QC organization without the expressed written permission of the Contracting Officer.

1. Coordinate preparation and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.

2. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals requiring Contracting Officer approval. The period of review for submittals with Contracting Officer approval begins when the Government receives the submittal from the QC organization. The period of review for each resubmittal is the same as for the initial submittal.

3. Determine and verify field measurements, materials, field construction criteria; review each submittal; check and coordinate each submittal with requirements of the work and contract documents.

4. Transmit submittals to the QC organization in orderly sequence, in accordance with the submittal register, and to prevent delays in the work, delays to the Government, or delays to separate contractors.

5. Correct and resubmit submittals as directed by the approving authority. Direct specific attention, in writing or on resubmitted submittals, to revisions not requested by the approving authority on previous submissions.

6. Furnish additional copies of submittals when requested by the Contracting Officer, to a maximum limit of 20 copies.

7. Complete work that must be accomplished as a basis of a submittal in time to allow the submittal to occur as scheduled.

8. Ensure no work has begun until submittals for that work have been returned as "approved" or "approved as noted" except to the extent that a portion of the work must be accomplished as a basis of the submittal.

Format of Submittals

Transmittal Form. Transmit each submittal, except sample installations and sample panels, to the office of the approving authority utilizing transmittal forms standard for the project. The transmittal form shall identify the Contractor, indicate the date of the submittal, and include information prescribed by the transmittal form and required in the paragraph entitled "Identifying Submittals". Process transmittal forms to record actions regarding sample panels and sample installations. Transmittal forms for submittals of sample panels and sample installations shall record any actions and locations of the samples.

Identifying Submittals. Identifying submittals, except sample panel and sample installation, submittals shall be identified with the following information permanently adhered to or noted on each separate component of each submittal and noted on the transmittal form. Mark each copy of each identically, with the following:

1. Project title and location.
2. Construction contract number and delivery order number.
3. The section and paragraph number of the section for which the submittal is required.
4. The Submittal Description (SD) number (see Exhibit 3.1) of each component of the submittal.
5. If a resubmittal, add an alphabetic suffix to the submittal description, for example, SD-10A, to indicate the resubmission.
6. The name, address, and telephone number of the subcontractor, supplier, manufacturer, and any other second tier contractor associated with the submittal.
7. Product identification and location in project.

Format of Product Data

1. Present product data submittals for each section as a complete, bound volume. Include a table of contents listing page and catalog item numbers for product data.
2. Indicate, by prominent notation, each product that is being submitted, indicate the specification section number, and paragraph number to which it pertains.

3. Supplement product data with material prepared for the project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for the project.

Format of Shop Drawings

1. Shop drawings shall be not less than 8 1/2 by 11 inches nor more than 30 by 42 inches.

2. Present 8 1/2 by 11 inches sized shop drawings as a part of the bound volume for the submittals required by the section. Present larger drawings in the sets.

3. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to the information required in the paragraph entitled "Identifying Submittals."

4. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Identify materials and products for work shown.

Format of Samples

1. Furnish samples in the sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:
   - Sample of equipment or device: Full size.
   - Sample of materials less than 2 by 3 inches: Built-up to 8 1/2 by 11 inches.
   - Sample of materials exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.
   - Sample of linear devices or materials, such as conduit and handrails: 10-inch length or length to be supplied, if less than 10 inches.
   - Sample of non-solid naturals, (e.g., sand, paint, etc.): One pint, unless specified otherwise in technical sections.
   - Sample panel: 4 feet by 4 feet.
   - Sample Installation: 100 square feet.

2. Samples showing range of variation: Where unavoidable variations must be expected, submit sets of samples of not less than three units showing the extremes and middle of the range.

3. Reusable samples: Incorporate returned samples into the work only if so specified or indicated. Incorporated samples shall be in an undamaged condition at the time of use.

4. Recording of sample installation: Note and preserve the notation of the area constituting the sample installation but remove the notation at the final cleanup of the project.

5. When a color, texture, or pattern is specified in naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

Format of Administrative Submittals

1. When the submittal includes a document which is to be used in the project or become a part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document, but to a separate sheet accompanying the document.

2. Operation and Maintenance Manual Data: Submit in accordance with the section entitled "Operation and Maintenance Data" of the individual delivery order.

Number of Copies of Product Data

1. Submit six (6) copies of submittals of product data requiring review and approval only by the QC organization and seven (7) copies of product data requiring review and approval by the Contracting Officer.

Number of Copies of Shop Drawings

1. For shop drawings presented on sheets larger than 8 1/2 by 14 inches, submit seven (7) prints of each shop drawing prepared for this project.

2. For shop drawings presented on sheets 8 1/2 by 14 inches or less, conform to the quality requirements for the product data.

Number of Samples

1. Submit two (2) samples, or two (2) sets of samples showing range of variation of each required item. One (1) approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.

2. Submit one (1) sample panel. Include components listed in the technical section or as directed.

3. Submit one (1) sample installation, where directed.

4. Submit one (1) sample of non-solid materials.

Number of Copies of Administrative Submittals

1. Unless otherwise specified, submit administrative submittals which are 8 1/2 by 14 inches or smaller in size in the quantity required for product data.

2. Unless otherwise specified, submit administrative submittals larger than 8 1/2 by 14 inches in size in the quantities required for shop drawings.

B . QC Organization Responsibilities

The Quality Control (QC) organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. The approving authority on submittals is the QC Manager unless submission to the Contracting Officer is specified for the specific submittal. The specific QC responsibilities for submittals are as follows:

1. Note the date on which the submittal was received from the contractor on each submittal for which the Site QC Manager is the approving authority.

2. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

3. Review submittals for conformance with project design concepts and compliance with the contract documents.

4. Act on submittals, determining the appropriate action based on the review of the submittal.
   - When the QC Manager is the approving authority, take the appropriate action on the submittal from the paragraph of "Possible Actions."
   - When the Contracting Officer is the approving authority or when a variation has been proposed, forward the submittal to the Contracting Officer with the certifying statement or return the submittal marked "Not Reviewed" or "Revise and Resubmit" as appropriate.

5. Ensure that the material is clearly legible.

6. Stamp each sheet of each submittal with the appropriate stamp, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only. When agreed to by the Contracting Officer, a single

cover sheet containing the required certification wording (see Exhibit 3.1a and 3.1b) may be utilized instead of the above. The stamp or cover sheet shall contain the following wording:

- When the approval authority is the Contracting Officer, the QC organization will certify submittals forwarded to the Contracting Officer with the following certifying statement:

  I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62470-93-D-3032, is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval. Government approval of proposed variation, if any, is recommended.

  Certified by Submittal Reviewer ____________________, Date ________

  Certified by QC Manager _________________________, Date ________

- When approving authority is the QC Manager, the QC Manager will use the following approval statement when returning submittals to the Contractor as "Approved" or "Approved as Noted":

  I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62470-93-D-3032, is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is ____ approved for use, ____ approved for use subject to Government approval of proposed variation.

  Certified by Submittal Reviewer ____________________, Date _______

  Approved by QC Manager _________________________, Date _______

7. Sign the certifying statement or approval statement. The signatures shall be in original ink. Stamped signatures are not acceptable.

8. Update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance by the Contracting Officer.

9. Retain a copy of approved submittals at the project site, including the contractor's copy of approved samples.

10. When the approving authority is the QC Manager, forward two copies of each approved submittal, except "Samples", where only one set is required, to the Contracting Officer.

Actions Possible

Submittals returned to the contractor shall contain one of the following notations:

1. "Not Reviewed" shall indicate the submittal has been previously reviewed and approved, is not required as a submittal, does not have evidence of being reviewed and approved by the Contractor, or is not complete. A submittal marked "Not Reviewed" shall be returned with explanation of the reason it is not reviewed. Returned submittals deemed to lack review by the Contractor or to be incomplete shall be resubmitted with appropriate action, coordination, or change.

2. Submittals marked "Approved" or "Approved as Submitted" authorize the Contractor to proceed with the work covered.

3. Submittals marked "Approved as Noted" authorize the Contractor to proceed with the work as noted provided the Contractor takes no exception to the notations.

4. Submittals marked "Revise and Resubmit" or "Disapproved" indicates the submittal is incomplete or does not comply with the design concept or the requirements of the Contract documents and shall be resubmitted with appropriate changes.

3.2 PERSONNEL AUTHORIZED TO REVIEW AND CERTIFY SUBMITTALS

In addition to the QC Manager, the personnel listed in Exhibit 3.2 are authorized to review and certify submittals as indicated. Any additional personnel required to review and certify submittals will be submitted in writing to the Contracting Officer for approval.

3.3 SUBMITTAL REGISTER

The submittal register is shown in Exhibit 3.3. The submittal register shall be maintained as follows:

1. Column (a): List each specification section in which a submittal is required.

2. Column (b): List each submittal description (SD No. and type, e.g., SD-04, Drawings) required in each specification section. Follow each submittal description with the list of

material of products to be addressed in each submittal description.

3. Column (c): List one principle paragraph in the specification section where a material or product is specified. This listing is only to facilitate submittal reviews. Do not consider entries in column © as limiting project requirements; do not consider that a blank must be filled in by the Contractor or the Government.

4. Column (d): Indicates approving authority for each submittal. A "G" indicates approval by the Contracting Officer; a blank indicates approval by the Site QC Manager.

5. Column (e): Indicates for submittals to be approved by Contracting Officer, specific reviewers other than the QC organization. This column may or may not be filled out on the copy supplied by the Government.

Columns (f) through (o) will be completed by the QC organization as follows:

6. Column (f): As submittals are processed, list a consecutive number assigned by the Contractor for each group of submittals. Place this same number in the appropriate block on the "Submittal Transmittal Form". For a resubmission, repeat transmittal control number of the original submittal with a suffix; e.g., No. "100B" is second resubmission of material originally transmitted under No. "100".

7. Column (g): List dates scheduled for approving authority to receive submittals. These dates are the scheduled beginnings of submittal review period. The Contractor proposes these dates and the Contracting Officer approves them to establish the approved submittal register.

8. Columns (h) and (I): Use to record Contractor's review when forwarding submittals to the QC organization.

9. Column (j): Enter date QC organization receives submittal from contractor.

10. Columns (k) and (l): If approving authority is Contracting Officer, enter date QC organization forwards certified submittal to Contracting Officer.

11. Columns (m) and (n): If approving authority is Contracting Officer, enter the Government action and date of action as shown on returned submittal. If approving authority is QC Manager, enter QC action and date of action.

12. Column (o): Enter date QC organization returns submittal to Contractor, regardless of who is approving authority. If QC Manager is approving authority, it is also the date the information is forwarded to the Government.

4.0 ACCREDITED LABORATORIES/ TESTING LABORATORIES

4.1 TESTING LABORATORY REQUIREMENTS

Testing services will be provided by an independent accredited testing laboratory qualified to perform sampling and tests. When the proposed testing laboratory is not accredited by and acceptable accreditation program, as described by the paragraph entitled "Accredited Laboratories," submit to the Contracting Officer for approval, certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

1. Sampling and testing shall be under the technical direction of a registered professional engineer (PE) with at least five years of experience in sampling and testing.

2. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077, 1990.

3. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666, 1990 (Rev. A).

4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740, 1988.

5. Laboratories engaged in nondestructive testing (NDT)/nondestructive examination (NDE) shall meet the requirements of ASTM E 543, 1989 (Rev. A).

6. Laboratories performing work in connection with specific sampling and chemical analysis of contaminated media according to the delivery order specification shall be handled as defined in the Sampling and Analysis Plan (SAP).

4.2 ACCREDITED LABORATORIES

Acceptable accreditation programs are the National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program, and the American Association for Laboratory Accreditation (AALA) program. Furnish to the Contracting Officer, a copy of the Certificate of Accreditation, Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required by the contract.

4.3 INSPECTION OF TESTING LABORATORIES

Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.

4.4 TEST RESULTS

Test reports shall cite applicable contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the QC Manager. The QC Manager shall furnish a summary report of field tests by attaching a copy of the report to the last daily Contractor Quality Control Report of each month.

5.0 TESTING PLAN AND LOG

5.1 TESTING PLAN AND LOG

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" (Exhibit 5.1) the date the test was conducted, the date the test results were forwarded to the Contracting Officer, any remarks and acknowledgment that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated testing plan and log to the last daily Contractor Quality Control Report of each month.

In development of the Testing Plan and Log, consideration shall be given to the use of multiple Testing Plans and Logs subdivided by definable features of the specification and/or of different materials within a definable feature section of the specification. When materials are tested on a specific frequency, accumulated material totals shall be recorded in the remarks section or on an attachment to each specific Testing Plan and Log to provide assurance that the tests are conducted at the required intervals.

5.2 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under the contract.

6.0 REWORK

6.1 REWORK DOCUMENTATION REQUIREMENTS

The QC Manager shall maintain a list of work that does not comply with the contract, identifying what items need to be reworked, the date the item was originally discovered, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the Rework Items List (Exhibit 6.1) to the last daily Contractor Quality Control Report of each month. The Contractor shall also be responsible for including on this list, items needing rework including those identified by the Contracting Officer.

7.0 MEETING

7.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan and prior to start of construction, meet with the Contracting Officer to discuss the QC program required for this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the QC Manager's duties with the Contracting Officer. A sample agenda is included as Exhibit 7.1. As a minimum, the Contractor's personnel required to attend shall include the Project Manager, Project Superintendent and QC Manager. Minutes of the meeting shall be prepared by the QC Manager and signed by both the Contractor and the Contracting Officer.

7.2 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every two weeks or as required scheduled by the Contracting Officer or delivery order. The meetings will be held at the work site, or where specified, with the project superintendent and the foreman responsible for the upcoming work in attendance. The QC Manager shall take steps as may be necessary to prevent the QC Meeting from becoming a production meeting. Often it is convenient to hold a production meeting following the QC meeting, however the minutes of these meetings shall be maintained separately. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. As a minimum, the following shall be accomplished at each meeting:

1. Review the minutes of the previous meeting.

2. Review the schedule and the status of work.
   - Work or testing accomplished since last meeting.
   - Rework items identified since last meeting.
   - Rework items completed since last meeting.

3. Review the status of submittals.
   - Submittals reviewed and approved since last meeting.
   - Submittals required in the near future.

4. Review the work to be accomplished in the next two weeks and documentation required. Schedule the three phases of control and testing:
   - Establish completion dates for rework items.
   - Identify Preparatory Phases required.
   - Identify Initial Phases required.
   - Identify Follow-up Phases required.

- Identify Testing required.
- Identify status of off-site work or testing.
- Identify documentation required.

5. Resolve QC and production problems.

6. Address items that may require revising the QC plan such as or changes in procedures.

In addition to the normal project distribution which includes the Contracting Officer, a copy shall be forwarded to the C.O.T.R., LANTDIV, the Program QC Manager, and the OHM Program Manager.

8.0 THREE PHASES OF CONTROL

The QC Manager shall perform the three phases of control to ensure that work complies with contract requirements. The three phases of control shall adequately cover both on-site and off-site work and shall include the Inspection Plan activities (see Exhibit 8.0) of each definable feature of work as listed in Exhibit 9.1.

8.1 PREPARATORY PHASE

Notify the Contracting Officer at least two working days in advance of each preparatory phase. Conduct the preparatory phase meeting with the superintendent and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report (Exhibit 8.1). Perform the following prior to beginning work on each definable feature of work:

- Review each paragraph of the applicable specification sections.
- Review the contract drawings.
- Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.
- Review the testing plan and ensure that provisions have been made to provide the required QC testing.
- Examine the work area to ensure that the required preliminary work has been completed.
- Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data.
- Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.
- Discuss construction methods.

8.2 INITIAL PHASE

Notify the Contracting Officer at least two working days in advance of each initial phase meeting. When crews are ready to start work on an a definable feature of work, conduct the initial phase meeting with the personnel responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. Repeat the initial phase for changes in personnel assigned responsibility for the work, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

- Establish the quality of workmanship required.
- Resolve conflicts.

- Review the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met.
- Ensure that testing is performed.

8.3 FOLLOW-UP PHASE

Perform the following for ongoing work daily, or more frequently as necessary, until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

- Ensure the work is in compliance with contract requirements.
- Maintain the quality of workmanship required.
- Ensure that testing is performed.
- Ensure that rework items are being corrected.

8.4 NOTIFICATION OF THREE PHASES OF CONTROL FOR OFF-SITE WORK

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

8.5 RECEIPT INSPECTION

The QC organization shall conduct Receipt Inspection of materials and equipment procured in accordance with the delivery order specification. In addition to the submittal documentation, which will be reviewed and approved as required under Section 3.0, Submittals, the following attributes will be inspected for each order/shipment as applicable:

- Material is same as specified by the Delivery Order Specification
- Quantity as specified by the procurement document
- Dimensions as required by the procurement document
- Shipping Damage
- Physical Damage
- Identification and Marking
- Protective Covers and Seals
- Cleanliness
- Workmanship

Materials and equipment found to be unacceptable at receipt inspection shall be rejected and "RED Tagged" (see Exhibit 8.5) until correction or replacement can be made. This material/equipment shall not be used until the corrective action results in satisfactory reinspection.

The results of the receipt inspection, by attribute, will be included in the Contractor Quality Control Report (Exhibit 8.1) for the date of inspection.

8.6 DOCUMENTATION

Reports are required for each day that work is performed and for every seven consecutive calendar days of no work and on the last day of no work periods. Account for each calendar day throughout the life of the contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

- Identify the control phase and the definable feature of work.
- Results of the preparatory phase meetings held, including the location of the definable feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedules have been discussed.
- Results of the initial phase meetings held, including the location of the definable features of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the contract, and the required testing has been performed and include a list of who performed the tests.
- Results of the follow-up phase inspections held, including the location of the definable features of work. Indicate in the report that for this definable feature of work that the work complies with the contract as approved and that required testing has been performed and include a list of who performed the tests.
- Results of the three phases of control for off-site work, if applicable, including actions taken.
- List the rework items identified, but not corrected by close of business.
- As rework items are corrected, provide a revised rework items list along with the corrective action taken.
- Include in the remarks section of the report pertinent information including directions received, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, QC meetings held, acknowledgment that as-built drawings have been updated, corrective direction given by the QC Manager and corrective action taken by the contractor.

- When the QC Manager believes that an attribute list type inspection is more appropriate for the inspection of specific definable features of work, he/she may use any type of form desired for this purpose. However, this or any other form utilized shall become an attachment to the daily Contractor Quality Control Report and shall not preclude any other requirements of the contract or this plan.

9.0 DEFINABLE FEATURES OF WORK

9.1 DEFINABLE FEATURES OF WORK

Exhibit 9.1 contains a list of definable features of work for this delivery order. A definable feature of work is a task that is separate and distinct from other tasks and requires separate control requirements. As a minimum, each division of the specification is considered a definable feature of work. However, at times there may be more than one definable feature of work in each division of the specification or a definable feature of work may include several specification sections. The QC Manager shall discuss the list with the Contracting Officer for possible expansion of the list.

10.0 EXHIBITS

The following forms are acceptable for providing the information required by this QC Plan and the contract, except as otherwise directed by the Contracting Officer. While use of these specific forms are not required by the contract, any other format used shall contain the same information and be approved by the Program QC Manager. Exhibit 10.1 includes additional forms used by the contractor. These forms and their use are not addressed in this QC Plan.

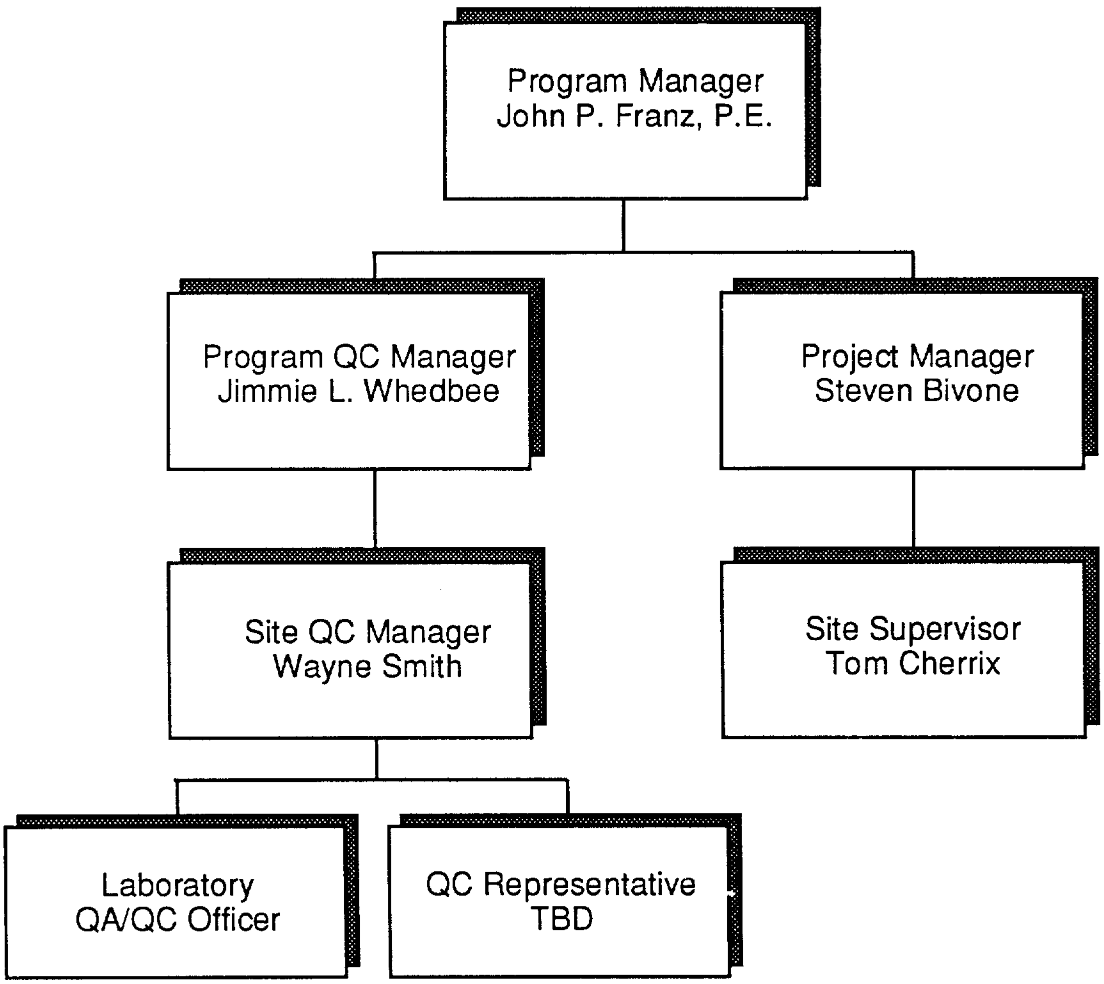
NOTE: Exhibit numbers refer to the paragraph from which the Exhibit was first addressed.

10.1 INDEX OF EXHIBITS

Exhibit 2.1

OHM Remediation Services Corp.

QC Organizational Chart



OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

SUBMITTAL DESCRIPTIONS

Exhibit 3.1

SD-01, Data

Submittals that provide calculations, descriptions, or other documentation regarding the work.

SD-02, Manufacturer's Catalog Data

Data composed of catalog cuts, brochures, circulares, specifications and product data, printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. A type of product data.

SD-03, Manufacturer's Standard Color Charts

Preprinted illustrations displaying choices of color and finish for a material or product. A type of product data.

SD-04, Drawings

Submittals that graphically show relationship of various components of the work, schematic diagrams of systems detail of fabrications, layout of particular elements, connections, and other relational aspects of the work. A type of shop drawing.

SD-05, Design Data

Design calculations, mix design, analyses, or other data written in nature and pertaining to a part of the work. A type of shop drawings.

SD-06, Instructions

Preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data Sheets, if any, concerning impedances, hazards, and safety precautions. A type of product data.

SD-07, Schedules

A tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work. A type of shop drawing

SD-08, Statements

A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other lower tier contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of method or personnel, qualifications, or other verification of quality. A type of shop drawing.

SD-09, Reports

Reports of inspection and laboratory test, including analysis and interpretation of test results. Each report shall be properly identified. Test method used and compliance with recognized test standards shall be described.

SD-10. Test Reports

A report signed by an authorized official of a testing laboratory that a material, product, or system identical to the material, product or system to be provided has been tested in accordance with requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within three years of the date of Contract award. A type of product data.

SD-11. Factory Test Reports

A written report that includes the findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for this project before it is shipped to the job site. The report must be signed by an authorized official of a testing laboratory and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-12. Field Test Reports

A written report that includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report must be signed by an authorized official of a testing laboratory or agency and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-13. Certificates

Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system, or material meet specified requirements. The statements must be dated after the award of this contract, name the project, and list the specific requirements that it is intended to address. A type of shop drawing.

SD-14. Samples

Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work. A type of sample.

SD-15. Color Selection Samples

Samples of the available choice of colors, textures, and finishes of a product or material, presented over substrates identical in texture to that proposed for the work. A type of sample.

SD-16. Sample Panels

An assembly constructed at the product site in a location acceptable to the Contracting Officer and using materials and methods to be employed in the work; completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the Contracting Officer. A type of sample.

SD-17. Sample Installations

A portion of an assembly or material constructed where directed and, if approved, retained as a part of the work. A type of sample.

SD-18, Records

Documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism. A type of administrative and close-out submittal.

SD-19, Operation and Maintenance Manuals

Data intended to be incorporated in an operations and maintenance manual. A type of administrative and close-out submittal.

SAMPLE DOCUMENT

COORDINATION AND MUTUAL UNDERSTANDING MEETING AGENDA
FOR
DELIVERY ORDER No. ______
__________________________ AT THE
U.S. NAVAL STATION,
____
____ __, 1996

The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the QC Manager's duties with the Contracting Officer.

The QC program consists of a QC Organization, QC Manager, a QC Plan for this Delivery Order, this Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review, submittal approval except for submittals designated for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with requirements of this contract.

Project QC Manager duties (contract para. 6.6.1)

- Attend this meeting
- Conduct the QC Meetings
- Perform the three phases of control
- Perform submittal review
- Perform submittal approval
- Ensure testing is performed
- Prepare QC certifications and documentation
- Perform other activities when approved by the Contracting Officer

Submittal Reviewers Duties and Qualifications (contract para. 6.7)

- Provide submittal reviewers qualified in the disciplines being reviewed other than the QC Manager, to review and certify that the submittals meet the requirements of the contract.

QC Plan (contract para. 6.8)

- (as specified therein)

Coordination and Mutual Understanding Meeting (contract para. 6.9)

- (see purpose above)

QC meetings (contract para. 6.10)

- The QC Manager shall conduct QC meetings once every two weeks or as otherwise directed by the Contracting Officer.

SAMPLE DOCUMENT

- Meeting minutes to be prepared by the QC Manager in accordance with the contract outline and a copy provided to the Contracting Officer within two working days of the meeting.
- A copy will be distributed to the Program QC Manager.

Three phases of control (contract para. 6.11)

- Preparatory Phase Meeting
- Initial Phase Meeting
- Follow-Up Phase Inspection

Submittal review and approval (contract para. 6.12 and Part 7.0, "Submittals")

- Review
- Approval
- Certification
- Submittal Register

Testing (contract para. 6.13)

- Testing Laboratory Requirements
- Accredited Laboratories
- Inspection and Testing Laboratories
- Capability Checks
- Test Results

QC certifications (contract para. 6.14)

- Contractor Quality Control Report Certification
- Invoice Certification
- Completion certification

Documentation (contract para. 6.15)

- Contractor Production Report
- Contractor Quality Control Report
- Testing Plan and Log
- Rework Items List
- As-Built Records
- Report Forms

  I. Contractor Production Report
  II. Contractor Quality Control Report
  III. Testing Plan and Log
  IV. Rework Items List

Exhibit 3.2

Operable OU2 Site 10

List of Personnel Authorized to Review and Certify Submittals

Specification Section:	Submittal Type:	Authorized Personnel:
	Equipment: VE equipment AS equipment Carbon vessel	Wayner Smith Tom cherrix Steven Bivone Gre Gilles Robert Keskonis

Operable Unit 0U2, Site 10

Exhibit 3.3 - Submittal Register

Spec. No.	SD No. and Type of Submittal Material or Product	Spec. Para. No.	Approval by CO	Gov. or A/E Reviewer	Trans. Control No.	Planned Sub. Date	Action Code	Date of Action	Date Forwarded to Appro. Auth./Date Received from Contr.	Date Forwarded to Other Reviewer	Date Received from Other Reviewer	Action Code	Date of Action	Mailed to Contr./Recd. from Appro. Auth.	Remarks
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
	Work Plan					8/15/97									
	Schedule					8/15/97									
	Mfrs. Catalog Data					8/15/97									
	Envir. Prot.. Plan					8/15/97									
	QC Plan					8/15/97									
	S&A Plan					8/15/97									
	H&S Plan					8/15/97									
Construction Submittals															
	As-built Records					CR									
	Mfrs. Catalog Data					8/11/97									
	Status Reports					Monthly									
	QC Meeting Minutes					As held									
	Test Results Summary Report					CR									
	Contractor Production Report					Daily									
	QC Report					Daily									
	Rework Items List					CR									
	Permits					Prior to Mob.									
	Contractor's Closeout Report					CR									
	Carbon Vessel														
	Field Test Reports					As performed									
	Certifications					As recieved									
	O&M Manual					<90 days f/startup									
	Compressor & blower data					Post startup									

CR - Closeout Report WP - Work Plan A- Approved AN - Approved as noted

Testing Plan and Log

Exhibit 5.1

Contract Number N62470-93-D-3032 D.O. 149		Delivery Order 0800 Operable Unit OU2 Site 10							Contractor OHM Remediation Services Corp.		
Specification Section and Paragraph Number	Item of Work	Test Required	Accredited /Approved Lab		Sampled By	Tested By	Location of Test		Date Completed	Date Forwarded to Contr. Off.	Remarks
			Yes	No			Onsite	Offsite			

Rework Items List **Exhibit 6.1**

Contract No. and Title: N62470-93-D-3032 - D.O. 0080, Operable Unit 02, Site 10, MCAS Cherry Point, NC

Contractor: OHM Remediation Services Corp.

Number	Date Identified	Description	Contract Requirement (spec Section and Par. No., Drawing No. and Detail No., etc.)	Action Taken by QC Manager	Resolution	Date Completed

SAMPLE DOCUMENT

COORDINATION AND MUTUAL UNDERSTANDING MEETING AGENDA
FOR
DELIVERY ORDER No. ______
______________________________ AT THE
U.S. NAVAL STATION,
____
____ __, 1996

The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the QC Manager's duties with the Contracting Officer.

The QC program consists of a QC Organization, QC Manager, a OC Plan for this Delivery Order, this Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review, submittal approval except for submittals designated for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with requirements of this contract.

Project QC Manager duties (contract para. 6.6.1)

- Attend this meeting
- Conduct the QC Meetings
- Perform the three phases of control
- Perform submittal review
- Perform submittal approval
- Ensure testing is performed
- Prepare QC certifications and documentation
- Perform other activities when approved by the Contracting Officer

Submittal Reviewers Duties and Qualifications (contract para. 6.7)

- Provide submittal reviewers qualified in the disciplines being reviewed other than the QC Manager, to review and certify that the submittals meet the requirements of the contract.

QC Plan (contract para. 6.8)

- (as specified therein)

Coordination and Mutual Understanding Meeting (contract para. 6.9)

- (see purpose above)

QC meetings (contract para. 6.10)

- The QC Manager shall conduct QC meetings once every two weeks or as otherwise directed by the Contracting Officer.

SAMPLE DOCUMENT

COORDINATION AND MUTUAL UNDERSTANDING MEETING AGENDA

FOR

DELIVERY ORDER No. ______

________________________ AT THE

U.S. NAVAL STATION,

____

____ __, 1996

The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the QC Manager's duties with the Contracting Officer.

The QC program consists of a QC Organization, QC Manager, a QC Plan for this Delivery Order, this Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review, submittal approval except for submittals designated for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with requirements of this contract.

Project QC Manager duties (contract para. 6.6.1)

- Attend this meeting
- Conduct the QC Meetings
- Perform the three phases of control
- Perform submittal review
- Perform submittal approval
- Ensure testing is performed
- Prepare QC certifications and documentation
- Perform other activities when approved by the Contracting Officer

Submittal Reviewers Duties and Qualifications (contract para. 6.7)

- Provide submittal reviewers qualified in the disciplines being reviewed other than the QC Manager, to review and certify that the submittals meet the requirements of the contract.

QC Plan (contract para. 6.8)

- (as specified therein)

Coordination and Mutual Understanding Meeting (contract para. 6.9)

- (see purpose above)

QC meetings (contract para. 6.10)

- The QC Manager shall conduct QC meetings once every two weeks or as otherwise directed by the Contracting Officer.

INSPECTION SCHEDULE
Operable Unit 02, Site 10
MCAS Cherry Point, NC
Delivery Order No. 0080

Exhibit 8.0

Spec. Section	Activity*	Preparatory Report No.	Initial Report No.	Follow-up Report Nos.**

*Also include schedule date if CPM Network is involved. **Include first and final inspections only

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED		
	THE SUBMITTALS HAVE BEEN APPROVED		
	MATERIALS COMPLY WITH APPROVED SUBMITTALS		
	MATERIALS ARE STORED PROPERLY		
	PRELIMINARY WORK WAS DONE CORRECTLY		
	TESTING PLAN HAS BEEN REVIEWED		
	WORK METHOD AND SCHEDULE DISCUSSED		

PHASE				TESTING PERFORMED & WHO PERFORMED TEST
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY			
	SAMPLE HAS BEEN PREPARED/APPROVED			
	WORKMANSHIP IS SATISFACTORY			
	TEST RESULTS ARE ACCEPTABLE			
	WORK IS IN COMPLIANCE WITH THE CONTRACT			
FOLLOW-UP	WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE			TESTING PERFORMED & WHO PERFORMED TEST

REWORK ITEMS IDENTIFIED (NOT CORRECTED BY CLOSE OF BUSINESS)	REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

REMARKS

On behalf of the contractor, I certify that this report is complete and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

AUTHORIZED QC MANAGER AT SITE DATE

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET	DATE
CONTRACT NO.	REPORT NO.

PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED		
	THE SUBMITTALS HAVE BEEN APPROVED		
	MATERIALS COMPLY WITH APPROVED SUBMITTALS		
	MATERIALS ARE STORED PROPERLY		
	PRELIMINARY WORK WAS DONE CORRECTLY		
	TESTING PLAN HAS BEEN REVIEWED		
	WORK METHOD AND SCHEDULE DISCUSSED		

PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT	TESTING PERFORMED & WHO PERFORMED TEST
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY			
	SAMPLE HAS BEEN PREPARED/APPROVED			
	WORKMANSHIP IS SATISFACTORY			
	TEST RESULTS ARE ACCEPTABLE			
	WORK IS IN COMPLIANCE WITH THE CONTRACT			

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET (ATTACH ADDITIONAL SHEETS IF NECESSARY)			DATE
CONTRACT NO.			REPORT NO.
PHASE	Y - YES, N - NO, SEE REMARKS, BLANK - NOT APPLICABLE	IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT	
FOLLOW-UP	WORK COUPLES WITH CONTRACT AS APPROVED IN INITIAL PHASE		TESTING PERFORMED & WHO PERFORMED TEST

Exhibit 8.5

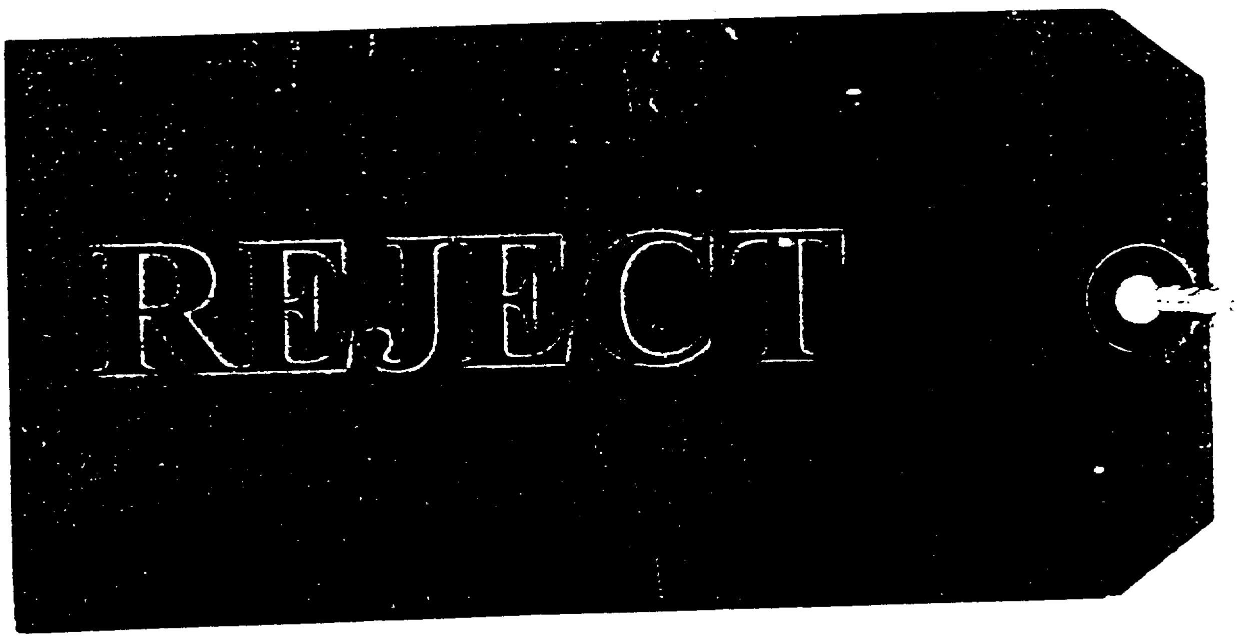


Exhibit 9.1

Operable Unit 02, Site 10

Definable Features of Work

Specification Section:	Definable of Feature of Work:
	Work Plan Submission Mobilization Well Installation System Start-up O&M Manual Closeout Report Submission

Exhibit 10.1a

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE		
CONTRACT NO.	TITLE AND LOCATION	REPORT NO.
CONTRACTOR	SUPERINTENDENT	
AM WEATHER	PM WEATHER	MAX TEMP °F	MIN TEMP °F

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRACE	HRS

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES, attach copy of the meeting minutes)	YES	NO	TOTAL WORK HOURS ON JOB SITE THIS DATE	
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES, attach copy of completed OSHA report)	YES	NO		
WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE? (If YES, attachment statement or checklist showing inspection perfomed)	YES	NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES, attach description of incident and proposed action)	YES	NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

☐ SAFETY REQUIREMENTS HAVE BEEN MET

EQUIPMENT MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTOR/SUPERINTENDENT ____________ DATE ____________

OHM Remediation Services Corp.

Routing: Contr. Adm.
Proj. Mgr
Site Supv.
Proj. Acct.
CSE
QC
Job File

Exhibit 10.1b

Project Name: ____________________
Delivery Order: ____________________
Contract Purchase Order N62470-93-D-3032
OHM Project Order ____________________

OVERTIME AUTHORIZATION (OTA)

Date of Request: __________ WBS Code: ______________ OTA No: __________

Reason for request ______________________________

Explanation:

[ ] Emergency
____
[ ] Equipment Maintenance
____
[ ] Keep critical activities on schedule
____
[ ] Accelerate schedule
____
[ ] Other
____

____

Initiated by:
____
[ ] Navy
____
[ ] OHM
____
[ ] Other
____

____

Estimated period of overtime work _____________ Start Date: __________
End Date: __________
ROM Cost Estimate ______________________

Requested By: ________________________________
Date: __________________
OHM Project Manager

APPROVALS

[ ] Approved [ ] Modified [ ] Rejected

Modification (if any)

____

____

____

RPM: ____________________________
Date: _____________
ROICC/NTR: ____________________________
Date: _____________

OHM Remediation
Services Corp.

Exhibit 10.1c

Routing: Contr. Adm.
Site Supv.
Proj. Acct.
CSE
QC
Job File
______
______
______

Project Name: ____________________
Delivery Order: ____________________
Contract Purchase Order N62470-93-D-3032
OHM Project Order ____________________

REQUEST FOR INFORMATION (RFI)

Date of Request: ____________	Suspense Date: ____________	VR No: ____________

SITUATION/CONDITION REQUIRING CLARIFICATION	Dwg Ref: ____________ Site Location ____________	Spec Sec: ____________

DESCRIPTION:

DATE RECEIVED BY:
Certifying Engineer: ____________ Tech. Rep: ________ ROICC: ________

RESPONSE:

Note: This is a clarification and does not create additional work that could be considered as a change to the contract drawings and /or specification.

RPM: ______________________________ Date: ____________

ROICC/NTR: ______________________________ Date: ____________

OHM Remediation Services Corp.

Exhibit 10.1d

Routing: Contr. Adm.
Site Supv.
Proj. Acct.
CSE
QC
Job File
______
______
______

Project Name: ______________________
Delivery Order: ______________________
Contract Purchase Order N62470-93-D-3032
OHM Project Order ______________________

VARIANCE REQUEST (VR)

Date of Request: ____________	Suspense Date: ____________	VR No: ____________

PROPOSED VARIANCE	Dwg Ref.: ____________ Site Location ____________	Spec Sec: ____________

DESCRIPTION:

Note: Approval of this variance will not result in an increase in cost or in time of performance to this contract.

Initiated By [ ] Navy
[ ] OHM
[ ] Regulatory Agency
[ ] Other

On-Site Engineer: ______________________ Date: ______________
OHM Project Engineer ______________________ Date: ______________
Site Quality Control Manager: ______________________ Date: ______________
OHM Project Manager: ______________________ Date: ______________

APPROVALS [ ] Approved [ ] Modified (see below) [ ] Rejected

Note: This is a clarification and does not create additional work that could be considered as a change to the cost of the project.

RPM: ______________________ Date: ______________
ROICC/NTR: ______________________ Date: ______________

OHM Remediation Services Corp.

Routing: Contr. Adm.
Proj. Mgr.
Site Supv.
Proj. Acct.
CSE
QC
Job File
John Franz-Prog.
COTR- J. Haste

Project Name: ____________

Delivery Order: ____________

Contract Purchase Order N62470-93-D-3032

OHM Project No. ____________

WORK DIRECTIVE (WD)

Date of Request: ________ WBS Code: ________ [ ] new code WD No: ______

WBS Description: ____________

TITLE OF WORK DIRECTIVE:

DESCRIPTION OF WORK: ____________

WORK DIRECTIVE TYPE

[ ] Technical direction — Explanation: ____________

[ ] Scope Growth (Mod to follow)
- [ ] Quanity Increase
- [ ] New Scope Item
- [ ] Other

[ ] Scope Reduction (Mod to follow)
- [ ] Quanity Decrease
- [ ] Scope Reduction
- [ ] Other

Attachments: ____________

Initiated By:
- [ ] Navy
- [ ] OHM
- [ ] Regulatory Agency
- [ ] Other

COST IMPACT — Rough order of Magnitude (ROM) Estimated value of item: ________

NOTE: This estimate includes direct costs, fringes and mark-ups. No fee.

SCHEDULE IMPACT
Estimated Duration of Item ________ Work Days
Estimated Schedule Impact ________ Calender days

Is approval date critical [ ] yes [ ] no — Reason for critical approval date: ________
If yes, indicate date: ________

OHM Representative: ________ Date: ________
On-Site Engineer: ________ Date: ________
OHM Project Manager: ________ Date: ________

APPROVALS — Note: Failure to approve by the critical date may result in additional cost and/or schedule impact.

[ ] Approved [ ] Modified (see attached) [ ] Rejected

RPM: ________ Date: ________

ROICC/NTR: ________ Date: ________

Work Directive (WD)

1.0 Purpose: The purpose of the Work Directive is to provide a standardized document that communicates approval, modification, or rejection of either scope change (growth or reduction) or cost change (growth or reduction) by field personnel. The WD is a communication vehicle and individually is not justification for a contract modification. Other factors will determine whether a contract modification is required. The WD should be used for significant issues that will have a cost, scope, and/or schedule impact to a delivery order.

Should the field condition requiring the WD arise from change in scope such as: Differing site conditions, changed or evolving design, design errors or omissions, or direction by the Navy to perform significant additional work, formal contract modification may be required. Several work directives may be consolidated under one contract modification. Submission of a contract modification request should be coordinated in advance with the customer, and in any event should occur prior to 75% financial completion.

Examples of cost growth items requiring the execution of WD are: Technical direction that does not significantly change the scope of work or the need for personnel, equipment or material required to complete the current scope that are not in the budget (this includes modified resources loading due to schedule changes). Refer to program established guidelines for identifying cost versus scope growth as applicable.

2.0 Completing the Form

All lines on the form are to be completed. If particular information is not applicable write N/A on the line.

Lines that should never say N/A are: Date of request, Cost Code, WD No:, Change Title, Reason for Change, ROM Estimate, Schedule impact, OHM signature, ROICC signature. It is the responsibility of both the Navy and OHM to ensure that sufficient explanation is provided so that the work proceeds as required. If sufficient room is not available on this form additional pages should be attached.

All parties listed on the distribution must be copied on all work directives. All work directives whether accepted or rejected must be logged and kept on-site for inspection by OHM and the Navy.

(ROM) Rough order of magnitude estimate should be included on all work directives. This estimate should be in Navy cost (OHM revenue) dollars.

Schedule Impact. 1) How long will it take to execute the directed task, and 2) How the overall project schedule will be impacted should be addressed. (If you are extending the rental a on piece of equipment, the duration for the extension is put on line 1).

3.0 Flow of Responsibility

A As soon as possible upon OHM's discovery of a cost or scope change or direction by Navy personnel on a proposed change, the OHM project manager should prepare and submits a WD to the ROICC.

The ROICC may elect to confirm the change with the NTR, RPM, the Engineer of Record or the Certifying engineer.

B The ROICC reviews the WD and indicates its approval status: Approved, Modified, or Rejected.

C The ROICC then forwards the WD to OHM for action as required.

D The contractor modifies the Construction Schedule, The Schedule of Values, the WBS and all reports as appropriate. OHM enters the WD in the WD log for submission in the Monthly Status Report to the Navy. OHM will track cost associated with the WD either as separate WBS or as part of an existing WBS.

E If a Modification to the Delivery Order is required, the WD(s) should be used as the basis for the request.

APPENDIX E

TRANSPORTATION DISPOSAL PLAN

Materials Handling, Transportation and Disposal Plan for the Construction and Operation of Air Sparging and Soil Vapor Extraction Remedial Systems Operable Unit 02, Site 10 MCAS Cherry Point, North Carolina

Submitted to:

Department of the Navy
Contract No. N62470-93-D-3032
Delivery Order No. 0080

Submitted by:

OHM Remediation Services Corp.
5445 Triangle Parkway, Suite 400
Norcross, GA 30092

C. John Rhyne
C. John Rhyne
Regional Transportation and Disposal Coordinator

Steven Bivone
Steven Bivone
Project Manager

OHM Project No. 17488

September 1997

TABLE OF CONTENTS

1.0 INTRODUCTION

This Materials Handling, Transportation and Disposal Plan (MHTDP) was prepared for use during remedial action activities to address the contaminated groundwater and soil at Operable Unit 01, Site 16 located on the Marine Corps Air Station (MCAS), Cherry Point, North Carolina.

The MHTDP objective is to specify the methods and procedures to be implemented by OHM to ensure that wastes generated during site activities will be transported, stored, treated, and disposed of in full compliance with applicable federal, state, and local rules and regulations.

2.0 CHARACTERIZATION OF WASTESTREAMS

Based on the information provided to OHM in the Statement of Work and Delivery Order Plans and Specifications, OHM will generate various types of Remedial Derived Waste which will require off-site disposal. These materials are outlined in Table 2.1.

OHM will complete characterization and disposal analysis of the waste materials generated form the remedial activities. For the purposes of this plan, OHM assumes that contaminants of concern are Chlorinated Volatile Organic Compounds.

OHM will collect samples in accordance with the Sampling and Analysis Plan and perform appropriate characterization and disposal analysis of the wastes described in Table 2.1 during the course of these projects. Final characterization and disposal alternatives are contingent upon those analyses. An addendum to this plan will be prepared with that information when it is available.

Table 2.1 Remedial Activity Derived Waste from Air Sparging/Soil Vapor Extraction, Operable Unit 01, Site 16

Waste	Description	Quantity	Disposal Method
PPE	Personal Protective Equipment generated during on-site remedial activity	32 Drums	TBD on analytical results
Decon Water Drilling Fluids	Decontamination water from equipment cleanup; water from well development	10,000 gallons	Base Industrial Water Treatment Plant
Drilling Muds	Soil cuttings from well installation	50 cubic yards	TBD on analytical results
Trenching Spoils	Soil from horizontal well installation and SVE system piping	585 cubic yards	*TBD on analytical results
Spent Carbon	Spent carbon from soil vapor extraction off-gas treatment	2,000 pounds	Regeneration by vendor
SVE Water	Water generated from the SVE process	4,000 gallons/ month (est)	Base Industrial Water Treatment Plant

*The 585 cubic yards of soils generated from trenching for the SVE system piping and horizontal wells will be used as backfill pending analytical results and MCAS Cherry Point EAD approval.

3.0 WASTE DISPOSAL APPROVAL

OHM will assign a T&D Coordinator to this project who will report to the Project Manager as a single point-of-contact for all waste management activities. The individual assigned to this project will be familiar with all the applicable portions of RCRA, CERCLA and SARA regulations – especially 40 CFR 261 (Identification and Listing of Hazardous Wastes). In addition this individual will be familiar with the State of North Carolina regulations related to hazardous and solid waste treatment, storage, disposal, and transportation. This individual will specify analyses needed to identify hazardous wastes. Based on this data and consultations with the Department of the Navy representatives, the project T&D Coordinator will assist the Department of the Navy in identifying regulated waste materials. The T&D Coordinator will also be responsible for preparing waste profiles to the selected disposal vendor and coordinating disposal approvals.

Based on the materials identified that will require off-site disposal, it is anticipated that the wastes generated will not be RCRA hazardous pursuant to 40 CFR 261.

The T&D Coordinator, in consultation with project management and procurement personnel, have reviewed potential vendors to prequalify transportation and disposal companies based on:

- NOV status
- Ability to handle the wastes identified
- Cost effectiveness of the available transportation and disposal options
- Past experience

At this time OHM has identified the following qualified vendors to provide transportation and disposal of non-hazardous Remedial Derived Waste for this Delivery Order:

- BFI Waste System
- Waste Management Inc.
- East Carolina Environmental

4.0 WASTE PACKAGING

All drummed waste of Personal Protective Equipment, soil cuttings, spent carbon, and decon/development water that is collected in 55-gallon (17H open-top) steel drums will be labeled and logged using OHM's standard drum inventory procedures (see Appendix A Drum Inventory Log). OHM will maintain these drum logs and a database summary of the type and quantity of wastes generated each day. Appropriate measures will be taken to keep off-site back-up copies of this data as well.

All materials will be accumulated onsite until sufficient quantities are available for shipment of a full load of drums or (20 to 30 cubic yards) of bulk material. Pending quantities of waste, OHM will bulk or package waste in bulk roll-off containers for cost effective disposal. OHM will conduct weekly inspections of the temporary waste storage areas. All temporary storage will be in compliance with 40 CFR 262.34 and the applicable North Carolina regulations.

Decon water, well development water, and SVE water will be stored in drums or storage tanks pending quantity and location of each respective site. These waters will be transported to the Base Industrial Water Treatment Plant for disposal, after analysis and MCAS Cherry Point review and approval.

5.0 PREPARATION OF REQUIRED DOCUMENTATION

OHM will prepare or oversee the preparation of all paperwork associated with off-site disposal for review and signature by LANTDIV and MCAS Cherry Point representatives. This will include TSDF waste profiles and bill of lading or non-hazardous waste manifests. The selected vendor(s) will be required to provide manifests and other shipping paperwork. A completed example of all manifests and other shipping paperwork will be provided for OHM's review and approval at least one week in advance of the scheduled start of shipments. After these documents are reviewed by OHM they will be provided to the MCAS Cherry Point EAD representative for review and signature. Final copies of all manifests and other shipping paperwork will be received by OHM's on-site personnel at least 24 hours in advance of the scheduled start of shipments.

The disposal vendors will provide written verification that the proposed disposal site is permitted to accept the contaminated materials generated from OU1, Site 16. The disposal vendors shall provide written verification that wastes were actual delivered to the disposal site.

6.0 TRANSPORTATION AND DISPOSAL

The T&D Coordinator will contact the selected vendor and schedule waste pick-ups (tankers, pump trailers and drums) in a timely manner to coordinate with the project schedule. Prior to shipment of wastes, OHM's on-site personnel, in conjunction with the T&D Coordinator, will complete the Waste Disposal Activities Checklist (see Appendix B). This checklist is to be completed for each waste shipment leaving the site. A copy of the completed form will be provided to the LANTDIV prior to waste transportation and with the Final Report.

OHM will maintain chronological organized files of weight tickets, manifest copies, LDR forms and other shipping paperwork for each shipment. OHM will also maintain a database of all pertinent information regarding each off-site shipment. copies of the manifest files and database printouts will be provide to the LANTDIV representatives upon request and at the completion of the project, in the Remedial Activities Report (RAR)

APPENDIX A

Drum Inventory Log

OHM Corporation

DRUM INVENTORY LOG

DRUM NO. ____
PROJECT NUMBER ____
PAGE ____ OF ____

PROJECT LOCATION ____ LOGGER ____ DATE ____
PROJECT CONTACT ____ SAMPLER ____ TIME ____
PHONE ____ WEATHER ____

DRUM TYPE: FIBER ☐ POLY-LINED ☐ STEEL ☐ POLY ☐ STAINLESS STEEL ☐ NICKEL ☐
LID TYPE: RINGTOP ☐ CLOSED TOP ☐
DRUM CONDITION: MEET DOT SPEC. ☐ GOOD ☐ FAIR ☐ POOR ☐
DRUM SIZE: 110 ☐ 85 ☐ 55 ☐ 42 ☐ 30 ☐ 16 ☐ 10 ☐ 5 ☐ OTHER ____
DRUM CONTENTS: VOLUME FULL ☐ 3/4 ☐ 1/2 ☐ 1/4 ☐ <1/4 ☐ MT ☐
OVERPACKED: NO ☐ YES ☐ Overpack Type: FIBER ☐ STEEL ☐ POLY ☐

LAYERS	PHYS. STATE: LIQUID	SOLID	GEL	SLUDGE	COLOR: USE STD COLORS	CLARITY: CLEAR	CLOUDY	OPAQUE	LAYER THICKNESS: INCHES
T									
M									
B									

FIELD ANALYSIS

pH ____ SU PID ____ ppm
DOSIMETER ____
OTHER ____

DRUM LABELS/MARKINGS

DOT HAZ ____ UN/NA ____

MFG NAME ____
CHEMICAL NAME ____
ADDITIONAL INFORMATION ____

LABORATORY COMPATIBILITY DATA

☐ MARK IF PHYSICAL STATE AND COLOR MATCHES THE ABOVE INFORMATION. IF NOT, STOP ANALYSIS AND NOTIFY PROJECT CONTACT. FURTHER WORK WILL NOT BE PAID FOR.

COMPATIBILITY CAT: ____
ANALYSTS: ____
DATE PERFORMED: ____

RADIATION: POS ☐ NEG ☐ ____ MREM/HR

LAYERS	PHYS. STATE: LIQUID	SOLID	GEL	SLUDGE	COLOR: USE STD COLORS	CLARITY: CLEAR	CLOUDY	OPAQUE	WATER SOL: SOLUBILITY SPSI DENSITY H OR L	REACT: A=AIR W=WATER	pH: STD. UNIT	HEX. SOL: S OR I	PER: + OR −	OXID: + OR −	CN: + OR −	SUL: + OR −	BIEL-STEIN: + OR −	FLASH POINT: <60°C + OR −	PCBs (25ppm): + OR −	PCB TEST COMP: NUMBER
T																				
M																				
B																				

COMMENTS: ____

PCB CONC. ____ PPM FLASH POINT ____ °C COMPATIBILITY COMP. BULK # ____
DATA REVIEWER: ____ DATA REVIEW DATE: ____
FIELD REVIEWER: ____ FIELD REVIEW DATE: ____

TRANSFER NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1				
2				
3				

APPENDIX B

Waste Disposal Activities Checklist

OHM Corporation

Waste Disposal Activities Checklist

Job Name: ______________________ **No.** __________

Waste Name: ______________________

Profile Number: ______________________

Work Order: ______________________

Waste Type:

[ ] Dry solid
[ ] Wet solid / sludge
[ ] Liquid
[ ] Other (specify ______________)

Shipment Form:

[ ] Drums (size/type ______________)
[ ] Tankers
[ ] Dump trailers
[ ] Rolloffs
[ ] Other (specify ______________)

Estimated Quantity: ______________________

Number of Loads: ______________________

Disposal Facility: ______________________

Address ______________________

Phone ______________________

EPA ID# ______________________

Contacts ______________________

Transporter: ______________________

Phone ______________________

EPA ID# ______________________

Contacts ______________________

See attached pages for:

Checklists
Drum labeling instructions (if applicable)
Example manifests & LDR forms
Drum or container lists
Shipping tracking forms
Special instructions

The site supervisor should review this material and the attached pages prior to performing work.

Notifications, Forms, Manifests & other Shipping Papers Checklist

Checklist of forms, notifications, manifests, and other paperwork associated with various federal, state and facility requirements & regulations. These items will be started by the T&D Coordinator but the site supervisor should review each for completion & inclusion with the shipment.

		Checked off on
[ ]	Determine if special state manifests are required. (AL, AR, LA, SC, & TX in the south)	__/__/__
[ ]	Verify current manifests are being used? Get current ones if not.	__/__/__
[ ]	Land Disposal Restriction notification(s) [ ] Facility LDR form required [ ] YES [ ] NO [ ] State LDR form required [ ] YES [ ] NO [ ] Current forms available and attached? [ ] Background information & data to complete form(s) in place? [ ] Forms completed & reviewed for accuracy [ ] Forms signed by OSC/Client? [ ] Forms included with material to be sent with shipment (i.e. manifest, etc.)	__/__/__

[ ]	Verify information or examples for manifests & labels is compiled & attached.	__/__/__
[ ]	Prepare manifests & LDR forms, and have them checked for accuracy. (The disposal facility will review and verify the accuracy and completeness of these forms.--SEND THEM ADVANCED COPIES!!!)	__/__/__
[ ]	Prepare drum labels, hazard class labels, & compile list of drum markings required. Labeling instruction sheets attached?	__/__/__
[ ]	Arrange for client/OSC signatures on manifests & LDR forms.	__/__/__

Disposal Facility & Transporter Checklist

Activities conducted by the T&D Coordinator relating to scheduling and transporting waste to disposal facilities. These items will be started by the T&D Coordinator but the site supervisor should review each for completion.

		Checked off on
[ ]	All approvals in place, or all facilities chosen?	___/___/___
[ ]	Disposal windows lined up? Facilities have agreed to a specific receipt date, or have agreed to allow transporter to schedule material. Spoke with ______________________	___/___/___

[ ]	Project management informed of final scheduling plans?	___/___/___
[ ]	Client/OSC informed of final scheduling plans?	___/___/___
[ ]	Field personnel informed of final scheduling plans?	___/___/___

[ ]	Three bids obtained for all disposal facility?	___/___/___
[ ]	Disposal 3-bid approved & signed by client?	___/___/___
[ ]	PO requisition for disposal completed & submitted?	___/___/___
[ ]	Disposal vendor(s) given POs?	___/___/___

[ ]	Three bids obtained for all transportation?	___/___/___
[ ]	Transportation 3-bid approved & signed by client?	___/___/___
[ ]	PO requisition for transportation completed & submitted?	___/___/___
[ ]	Transportation vendor(s) given POs?	___/___/___

[ ] Transporter(s) are clear on the following: ___/___/___

- [ ] Arrival times & dates
- [ ] Delivery times & dates
- [ ] Equipment required
- [ ] Types of trucks expected
- [ ] Directions to site
- [ ] Road & driving conditions at site
- [ ] Site contacts & phone numbers
- [ ] Subs are OK provided OHM informed
- [ ] Billing and contracting details

Drum Checklist

The site supervisor should review each of these for completion before loading drums on the truck.

		Checked off on
[ ]	Drums have been checked against inventory--there are no extra or missing drums?	__/__/__
[ ]	Drums are in good shape--or they have been overpacked? [ ] No leaks [ ] No dents greater than silver dollar size [ ] No creases greater than six inches [ ] No lid, ring or bung damage [ ] No damage to the seams or chimes [ ] No waste on the outside of the drum [ ] No large discolored areas on the drum	__/__/__
[ ]	ALL drums are numbered with the numbers on the top AND side?	__/__/__
[ ]	ALL drums have a complete waste label--either a yellow & red hazardous waste label or green non-hazardous label	__/__/__
[ ]	Drums have hazard class labels (if required) on their tops AND sides?	__/__/__
[ ]	Drums have approval numbers written on the top AND side	__/__/__
[ ]	Drums have the TSDF name written on the side?	__/__/__
[ ]	If multiple trucks are used, an inventory record of which drums were loaded onto each truck is being made?	__/__/__

Drum Labeling Checklist

The site supervisor should review each of these for completion before loading drums on the truck.

		Checked off on
[ ]	Site supervisor has sufficient quantities of the appropriate drum labels? [ ] Hazardous waste labels (yellow & red) [ ] Non-hazardous labels (green) [ ] Hazard class labels (i.e. flammable liquid. etc) (which ______________________) (______________________)	___/___/___
[ ]	Site supervisor has completed drum labels or has reviewed drum labeling instructions?	___/___/___
[ ]	Information on the drum labels is complete and matches the information on the manifest--This particularly important to double check when more than one manifest or truck is being used. Manifest numbers and other information will vary from truck to truck and manifest to manifest. Drum labels must match the specific manifest and the specific truck they are loaded onto. [ ] Generator's name [ ] Generator's address [ ] Generator's EPA ID number [ ] DOT shipping name (Hazardous waste labels only) [ ] EPA waste codes (Hazardous waste labels only) [ ] Manifest number(s) (Hazardous waste labels only) [ ] Accumulation Start Date (Hazardous waste labels only)	___/___/___

Manifest Checklist

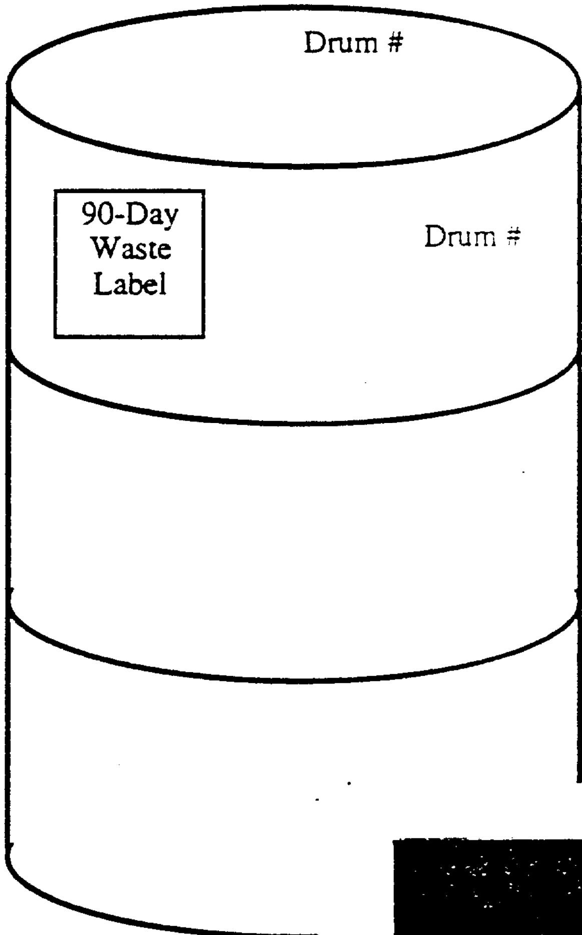
Activities conducted by the Site Supervisor relating to manifests, LDR forms and other pre-shipment paperwork.

		Where to look	Checked off on
[ ]	Site supervisor has sufficient quantities of the appropriate manifests?		___/___/___
[ ]	Site supervisor has completed manifests or has reviewed manifest preparation instructions?		___/___/___
[ ]	Is a unique manifest number assigned to each manifest?	Section 1.	___/___/___
[ ]	Generator, Transporter, and Disposal facility information (including EPA id numbers, addresses, & phone numbers) complete & accurate--does it match sample manifests or manifest preparation instructions?	Sections 3-9 & A-H	___/___/___
[ ]	DOT description complete & accurate?	Section 11 lines a-d	___/___/___
[ ]	Number of containers, quantities, unites complete & accurate? Have the correct abbreviations been used?	Sections 12-14 lines a-d	___/___/___
[ ]	"Additional Description" section (including approval numbers and work order numbers) is complete & accurate?	Section J	___/___/___
[ ]	"Handling Codes" section (including emergency response guidebook codes) is complete & accurate?	Section K	___/___/___
[ ]	"Special Handling" section (including emergency phone number, and other special instructions) is complete & accurate?	Section 15.	___/___/___
[ ]	Client has signed manifest?	Section 16	___/___/___
[ ]	Transporter has signed manifest?	Section 17	___/___/___
[ ]	OHM has retained last page or a copy of manifest for our records?		___/___/___

[ ]	LDR form is complete & included with manifest?		___/___/___
[ ]	LDR form has been signed by client?		___/___/___

90-Day Waste Accumulation Labeling Instructions

(These labels are required while drums are stored on site before transportation.)



SEE EXAMPLE LABEL BELOW...
NOTE: Label layouts may differ

40 CFR 262.34 states that a generator may accumulate hazardous waste on-site for 90-days or less provided that:

(1) The waste is placed in containers and the generator complies with subpart I of 40 CFR 265 (See OHM's drum inspection log);

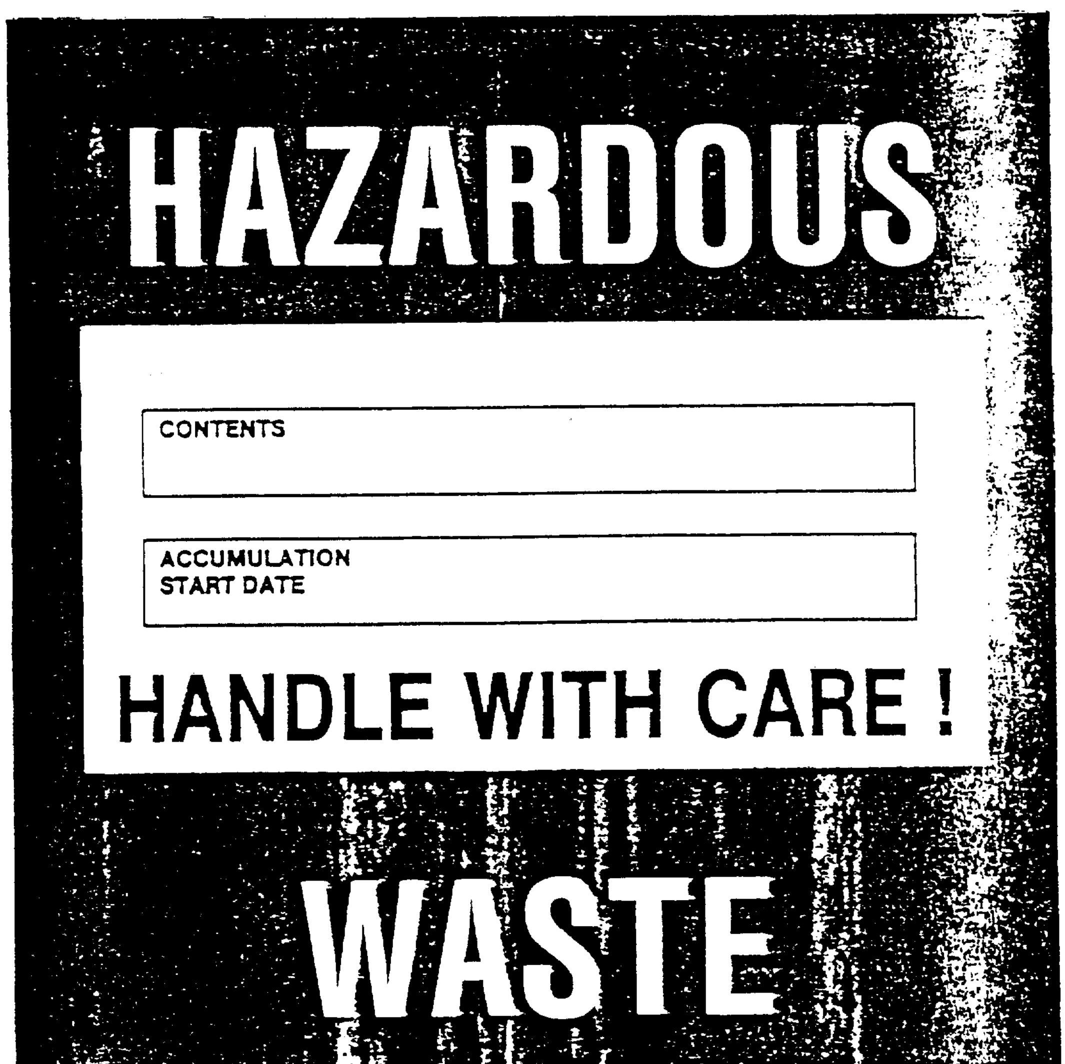
(2) The "Accumulation Start Date" is clearly marked on each container: and

(3) Each container is labeled clearly with the words 'Hazardous Waste".

These labels comply with this rule and will be required on ALL drums OHM leaves on-site while conducting analysis and arranging disposal unless the drums are KNOWN to be non-regulated.

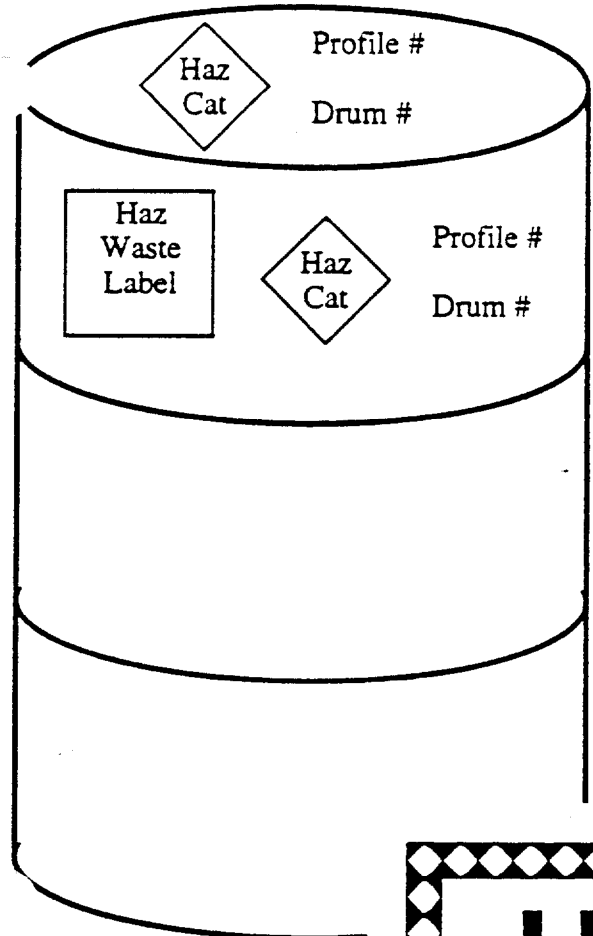
Drum Numbers for these instructions:

Comments:



34-HML-S

Hazardous Waste Drum Labeling Instructions
(These labels are required to transport waste drums)



Waste Group ______________________

Profile Number ______________________

Hazard Category (check all applicable)
[ ] Flammable Liquids (Class 3)
[ ] Oxidizers (Class 5.1)
[ ] Poison (Class 6.1)
[ ] Corrosive (Class 8)
[ ] Miscellaneous (Class 9)
[ ] Other ______________________

SEE EXAMPLE LABEL BELOW...
NOTE: Label layouts may differ

Drums must be in good condition, this means:
- No leaks
- No dents greater than silver dollar size
- No creases greater than six inches
- No lid, ring or bung damage
- No damage to the seams or chimes
- No waste on outside of drum

Drum Numbers for these instructions:

____

____

____

____

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Comments:

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HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL.
IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

GENERATOR INFORMATION:

NAME ______________________

ADDRESS ______________________ PHONE ______________________

CITY ______________________ STATE ________ ZIP ______________

EPA ID NO. / MANIFEST DOCUMENT NO. ______________________ / ______________

ACCUMULATION START DATE ______________________ EPA WASTE NO. ______________

____

____

____

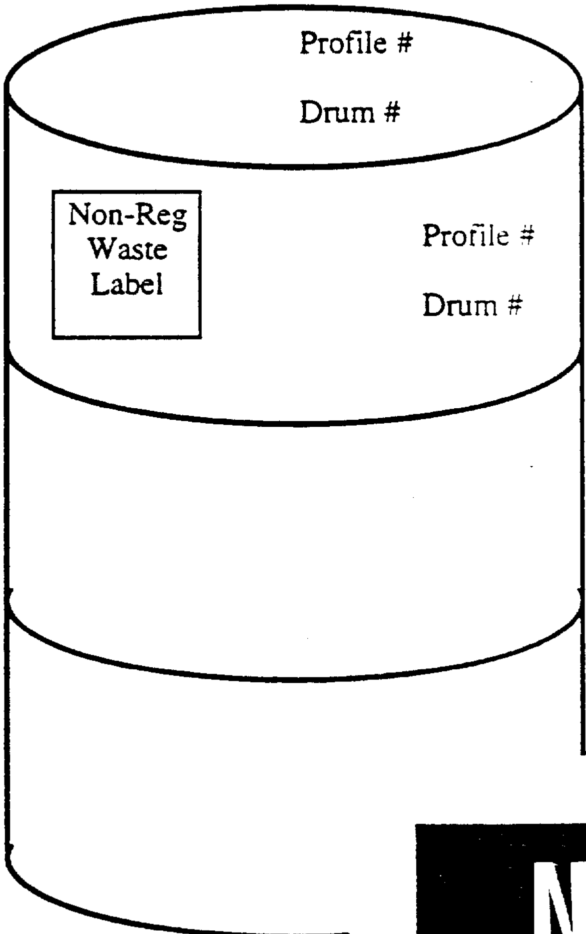
D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

STYLE CFWM6

NON-HAZARDOUS WASTE DRUM LABELING INSTRUCTIONS

(THESE LABELS ARE REQUIRED TO TRANSPORT WASTE DRUMS)



Waste Group ______________________

Profile Number ______________________

SEE EXAMPLE LABEL BELOW ..
NOTE: Label layouts may differ

Drums must be in good condition, this means:
- No leaks
- No dents greater than silver dollar size
- No creases greater than six inches
- No lid, ring or bung damage
- No damage to the seams or chimes
- No waste on outside of drum

Drum Numbers for these instructions:

____
____
____
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Comments:

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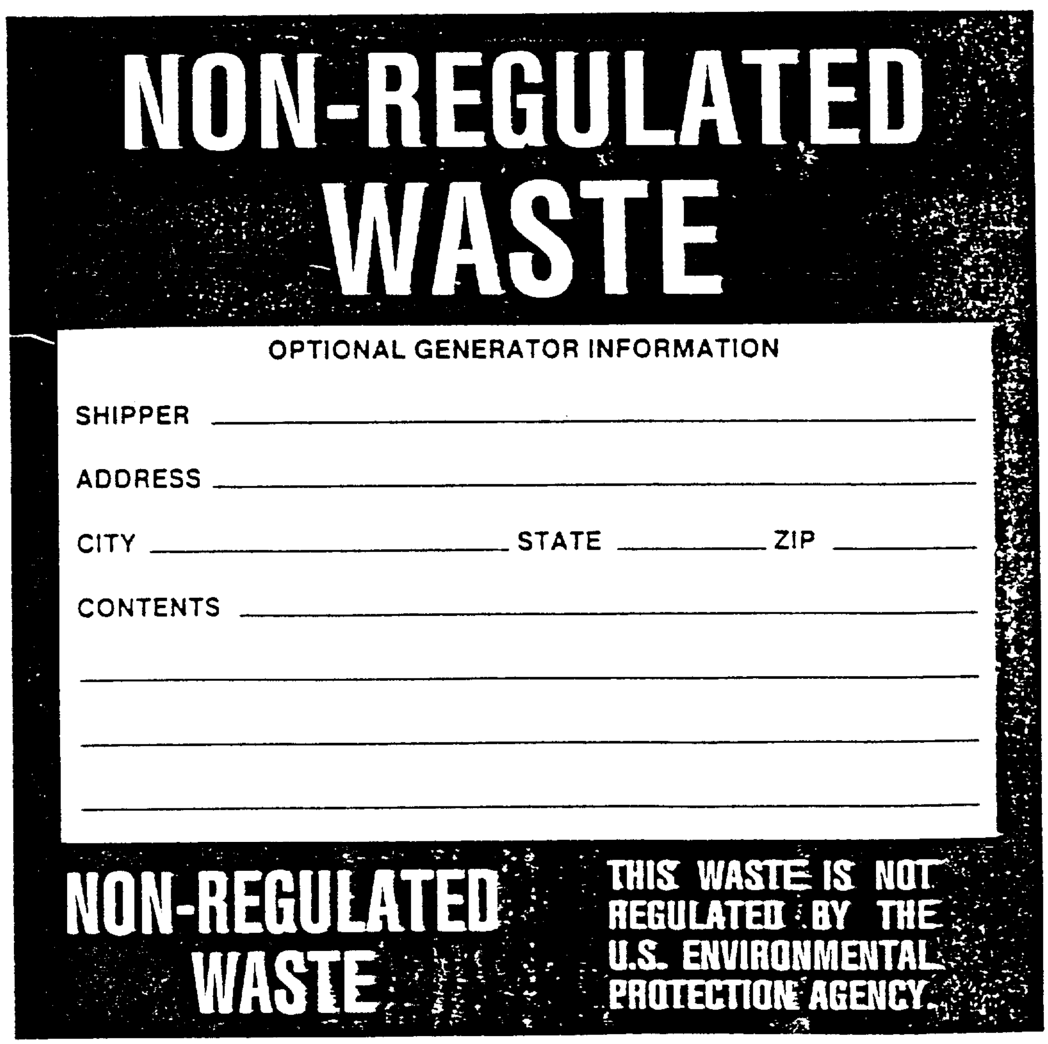


NON-REGULATED WASTE

OPTIONAL GENERATOR INFORMATION

SHIPPER ______________________

ADDRESS ______________________

CITY ______________ STATE __________ ZIP __________

CONTENTS ______________________

____

____

____

NON-REGULATED WASTE

THIS WASTE IS NOT REGULATED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

 36-[illegible]

OHM CORPORATION

WEEKLY DRUM INSPECTION LOG

VERSION 5/19/94

Site Name ______________________ OHM Job # ______________

Project Manager ______________________ Site Supervisor ______________

Site Phone ______________________ Site Fax ______________

Generator / Client Name ______________________ Contract # ______________

Site/Manifest Address ______________________________________

____

Site EPA ID # ______________________________________

Accumulation start date(s) ______________________________________

A weekly inspection is required by state and federal regulations for drums or containers of hazardous waste left at OHM job sites. (40 CFR 265 Subpart I). If the answer to any question is **YES** contact the project manager for instructions--immediate attention will be required to fix the problem.

YES	NO	
		Is there any evidence of leaking containers?
		Are there any containers which show signs of damage caused by corrosion, dents, creases or any other problem?
		Are there any containers which do not have a properly secured lids and bungs?
		Are there any containers that are not labeled or that have labels which are not clearly visible?
		Are any accumulation dates on labels over 90 days?
		Are the drums stored more than 15 meters (50 feet) from the property line?
		Are the containers stored near a source of ignition? (e.g. open flames, cutting or welding, hot surfaces, frictional heating, or sparks)
		Are "No Smoking" signs, "Hazardous Waste" signs, or caution tape around the storage area missing or not clearly visible?
		Are containers of incompatible waste stored near each other or improperly segregated? (e.g. acids near cyanides, oxidizers near organics, or poisons near anything)

COMMENTS:

____

____

____

____

____

Date ________ Time ________ Name ________________ Signature ________________

APPENDIX F

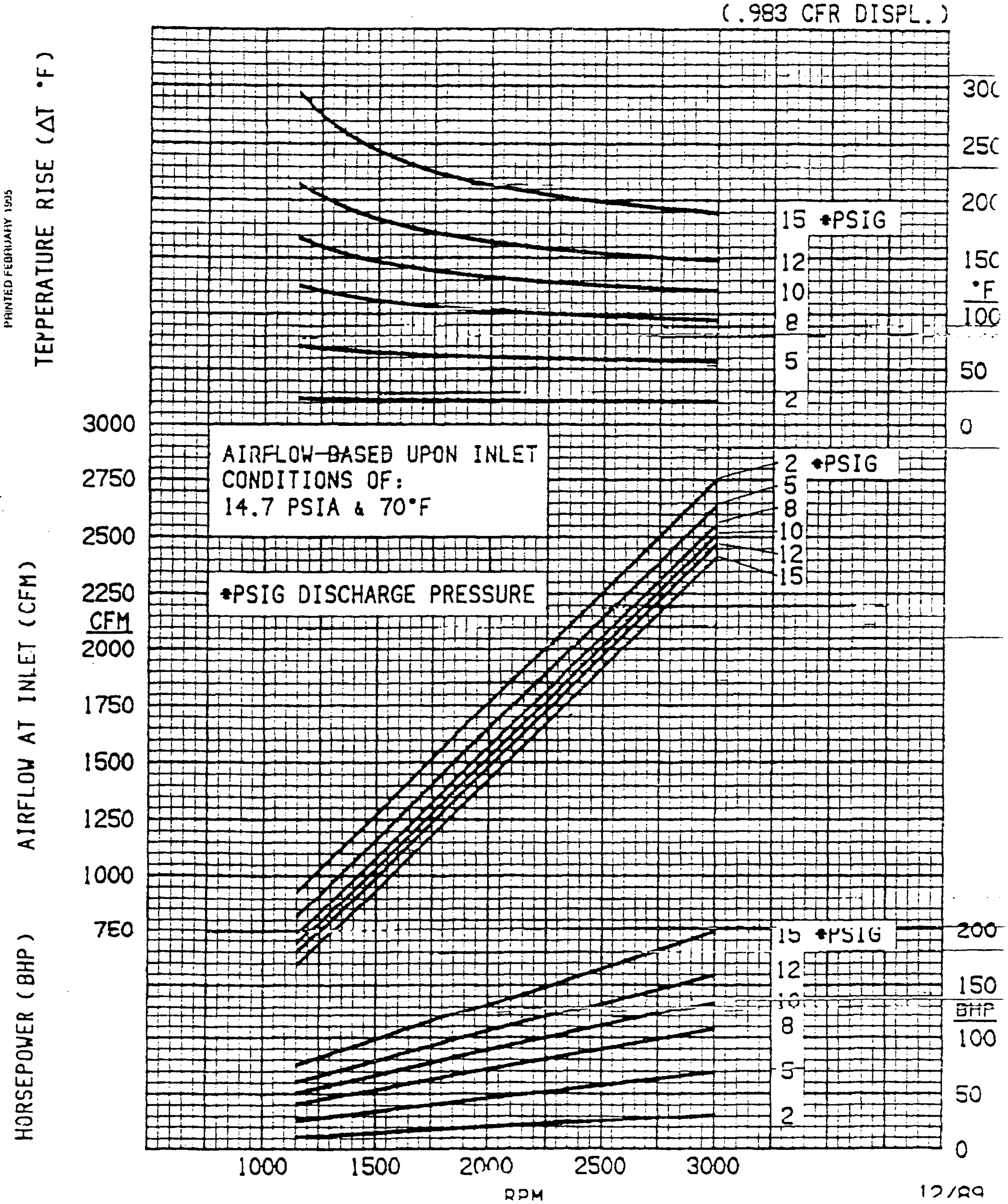
MANUFACTURER'S CATALOG DATA

JUL 16 '97 15:39

TUTHILL CORPORATION | M-D Pneumatics Division Springfield Missouri USA

C-1392

7017 PRESSURE SLIP CURVE



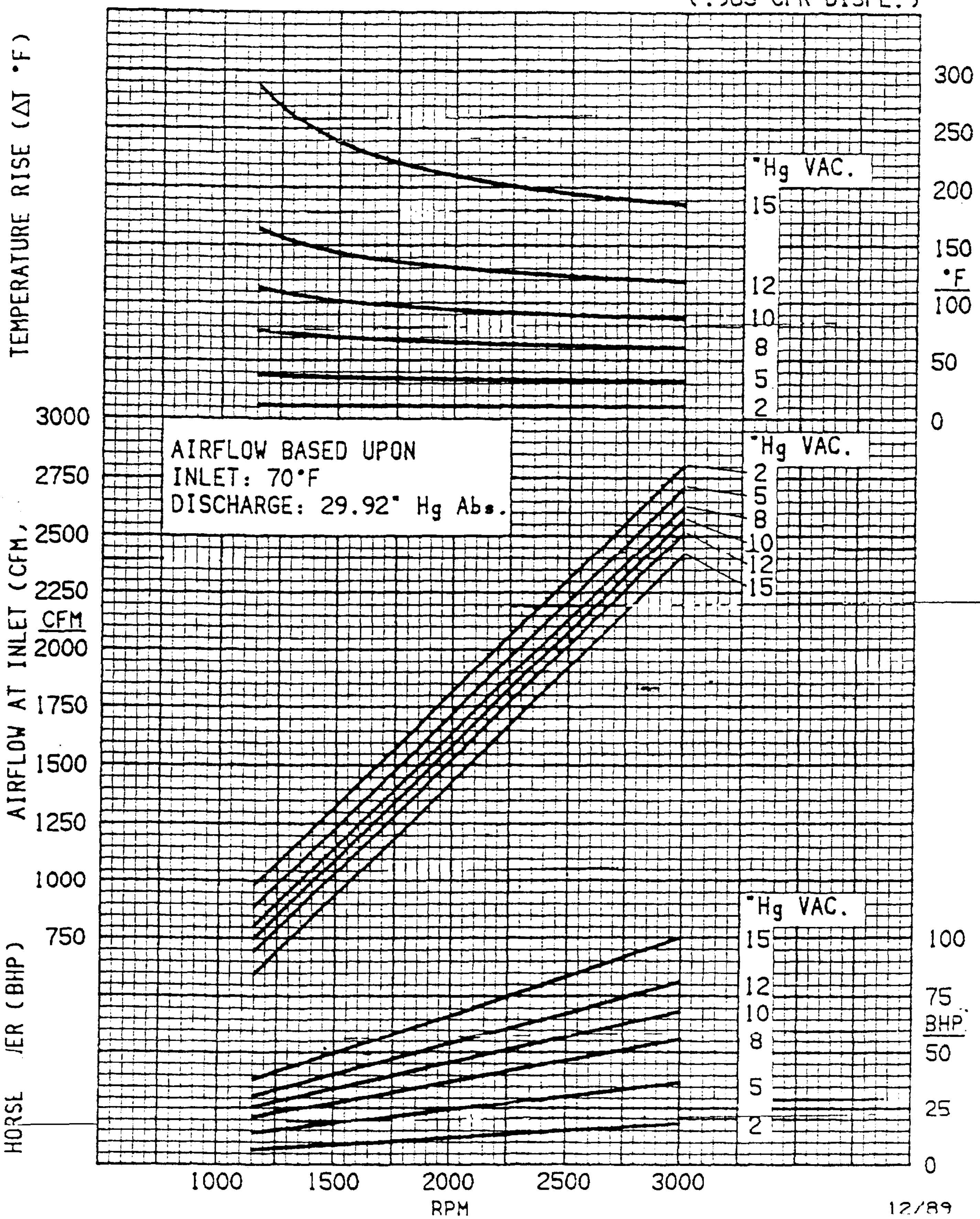
12/89

TUTHILL CORPORATION | M-D Pneumatics Division Springfield Missouri USA

C-1396

7017 VACUUM SLIP CURVE

(.983 CFR DISPL.)



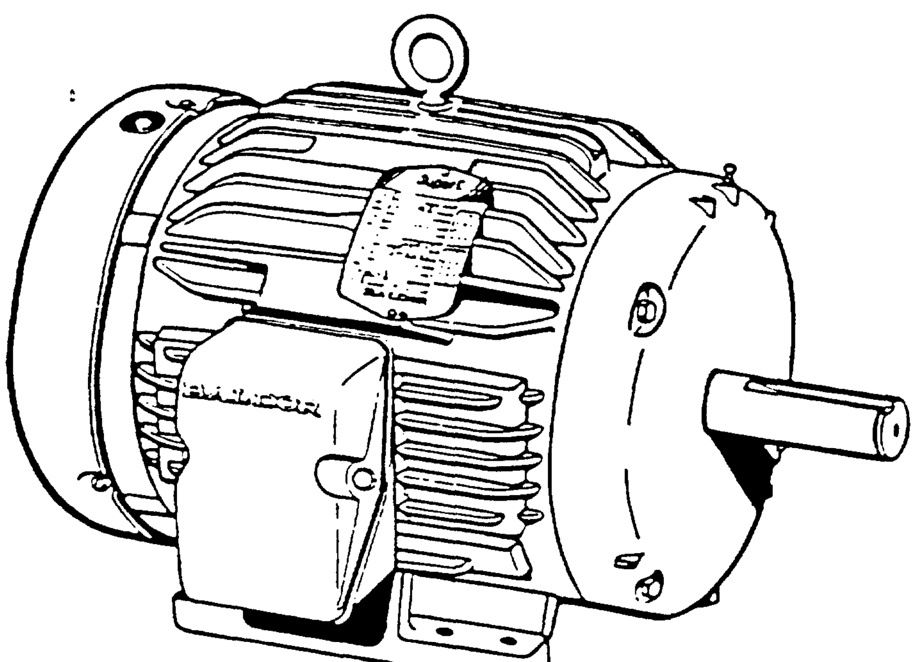
OU2

EQUIPMENT
CUT SHEETS
FOR(1)SUE UNIT
AND(2)CARBON U[illegible]

BALDOR®
MOTORS AND DRIVES

BALDOR ELECTRIC COMPANY
INSTRUCTION, OPERATION AND
MAINTENANCE MANUAL

INTEGRAL HORSEPOWER
AC INDUCTION MOTORS
TEFC ENCLOSURE



SAFETY PRECAUTIONS

WARNING: High voltage and rotating parts can cause serious or fatal injury. Installation, operation, and maintenance of electric machinery should be performed by qualified personnel.

Familiarization with NEMA publication MG-2, safety standard for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices is recommended.

For equipment covered by this instruction manual, it is important to observe the following safety precautions to avoid possible injury:

Avoid contact with energized circuits or rotating parts.

Avoid by-passing or rendering inoperative any safe guards or protective devices.

Avoid use of automatic reset devices where automatic restarting of equipment might be hazardous to the safety of personnel.

Failure to properly ground the frame of this machine can cause serious injury to personnel. Grounding should be in accordance with the National Electrical Code and consistent with pertinent local codes and practices.

Make sure that the shaft key is fully captive before the motor is energized.

Avoid extended exposure in close proximity to machinery with high noise levels.

Use proper care and procedures in handling, lifting, storing, installing, operating, and maintaining the equipment.

If eyebolts are used for lifting motor,they must be securely tightened. The lifting direction should not exceed a 20-degree angle with the shank of the eyebolt or the lifting lug for safe lifting.

Do not lift both the motor and the driven equipment with the motor lifting provisions. Motor lifting provisions are adequate for lifting the motor only.

Qualified maintenance personnel and safe maintenance practices are imperative. Be sure that the following precautions are taken before beginning maintenance:

The equipment connected to the shaft will not cause mechanical rotation.

Disconnect main machine windings and all accessory devices from the power source before disassembly of motor.

If a high potential insulation test is required, procedure and precautions as outlined in NEMA MG-1 and MG-2 standards should be followed.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently, consult your Baldor distributor or an authorized Baldor Service Center.

RECEIVING

Each shipment should be thoroughly inspected upon arrival. Any damage should be immediately reported to the carrier and a claim filed. For additional assistance,contact the Baldor distributor from whom you purchased the motor.

These motors are not designed for atmospheric conditions requiring explosion proof operation, such as flammable or combustible vapors or dust.

Failure to observe these precautions may result in damage to the equipment, injury to personnel, or both.

MOUNTING: The motor must be securely mounted to a rigid foundation to minimize vibration and to maintain alignment between the motor and the driven equipment or vibration and bearing damage may result. Foundation caps and sole plates, when used, are designed to act as spacers between the true foundation and the machine and must be evenly supported by the foundation. After accurate alignment of the drive and load-machine shafts, the base should be grouted to the foundation.

Motors may, under certain conditions, be mounted other than horizontally. Consult your Baldor distributor or an authorized Baldor Service Center for further information.

The standard motor base is suitable for horizontal or vertical mounting. Adjustable bases or sliding rails are suitable for horizontal mounting.

ALIGNMENT

Direct Coupling - Align motor accurately with the driven unit. For direct drive, use flexible couplings if possible. For drive recommendations, consult drive or equipment manufacturers.

Accurate mechanical alignment is essential for successful operation. Mechanical vibration and roughness in running the motor may indicate poor alignment. It is recommended that the alignment be checked with dial indicators. The space between coupling hubs should be maintained as recommended by the coupling manufacturer.

End-Play Adjustment - The axial position of the motor frame with respect to the load is important. The bearings are not designed to take excessive external axial thrust loads.

Belt Drive - Refer to NEMA MG-1 section 14.07 for the application of pulleys, sheaves, sprockets, and gears. Align the sheaves carefully to minimize belt wear and axial load on bearings. Belt tension should be sufficient to prevent belt slippage at rated speed and load, however, slippage may occur during starting.

DO NOT OVER-TENSION BELTS

The pulley ratio should not exceed 8:1. For more information, contact your Baldor distributor or an authorized Baldor Service Center.

DOWELING & BOLTING

After alignment, dowel pins should be inserted through the motor feet into the foundation to maintain the position of the motor should removal be required. Baldor has made provisions on the frame for doweling. Dowel holes should be drilled in the provided location in diagonally opposite feet. These holes should be drilled and reamed together with corresponding holes in the foundation and properly fitting dowel pins inserted.

Mounting bolts must be carefully tightened to prevent changes in alignment and possible damage to equipment. It is recommended that a flat washer and a lock washer be used under each nut or bolt head to insure a secure hold on the motor feet. Flanged nuts or bolts may be used as an alternative to washers.

INITIAL START-UP

♦ CAUTION: Read each of the following steps carefully before attempting to start motor.

IMPORTANT: If driven equipment can be damaged by rotating in the wrong direction, remove or uncouple motor from the load before checking for rotation.

If direction of rotation needs to be corrected, disconnect input power supply and interchange any two input power leads or refer to the connection diagram on the nameplate or inside of the conduit box cover.

1. Check direction of rotation by momentarily applying power to the motor.

2. It is preferred that the initial start and running of the motor be in an uncoupled no load state.

3. After starting the motor, check that the motor is running smoothly without excessive noise or vibration. If either is present, shut down the motor immediately and investigate. The motor should be run uncoupled for approximately 30 minutes to 1 hour.

COUPLED START-UP

1. After initial start-up procedures are performed successfully, stop motor, assemble the coupling.

2. Check to be sure that the coupling is properly aligned and not binding in any manner.

3. The first coupled start-up should be with no load. Check to see that the driven equipment is not transmitting any vibration back to the motor through the coupling or the base, and any vibration is within an acceptable level.

4. Run for a period of approximately 1 hour with driven equipment in an unloaded condition.

5. After successfully completing these steps, the equipment can now be loaded.

Do not exceed the value of nameplate amperes times the service factor under steady continuous load.

JOGGING AND REPEATED STARTS

Repeated starts and/or jogs of induction motors greatly reduce the life of the winding insulation. The heat produced by each acceleration or jog is much more than that dissipated by the motor under full load. If it is necessary to repeatedly start or jog a motor, it is advisable to check the application with the local Baldor distributor or an authorized Baldor Service Center or refer to NEMA MG1-12.50.1.

Heating - Duty and maximum ambient temperature are stated on the nameplate of the motor. If there is any question regarding safe operation, contact the local Baldor distributor or an authorized Baldor Service Center.

Overheating of the motor may be caused by improper ventilation, excessive ambient temperature, dirty conditions, excessive current due to overload or unbalanced AC voltage.

RELUBRICATION RECOMMENDATIONS

TYPE OF GREASE

A high grade ball and roller bearing grease. Recommended greases for standard service conditions are:

Shell Dolium R or Chevron SRI.

If other greases are preferred, check with a local Baldor Service Center for recommendations.

RELUBRICATION INTERVALS

Table I: Recommended relubrication intervals at standard service conditions.

NEMA/(IEC) FRAME SIZE	RATED SPEED - RPM			
	3600	1800	1200	900
Up to 210 incl. (132)	5500 hrs	12000 hrs	18000 hrs	22000 hrs
Over 210 to 280 incl. (180)	3600 hrs	9500 hrs	15000 hrs	18000 hrs
Over 280 to 360 incl. (225)	*2200 hrs	7400 hrs	12000 hrs	15000 hrs
Over 360 to 5000 incl. (300)	*2200 hrs	3500 hrs	7400 hrs	10500 hrs

* Bearings in 360 through 5000 frame, 2 pole motors are either 6313 or 6314 bearings. Stated relubrication interval reflects this selection. If roller bearings are used, the listed relubrication interval is to be divided by 2.

Table IV - Bearing Sizes and Types

FRAME SIZE	BEARING DESCRIPTION (THESE ARE THE "LARGE" BEARINGS IN EACH FRAME SIZE)					
NEMA/(IEC)	Largest Bearing in size category	OD D mm	Width B mm	Weight of Grease to be Added	Volume of grease to be added	
				GRAMS/OZ	IN³	tsp
Up to 210 incl. (132)	6307	80	21	8.4/.30	0.6	2.0
Over 210 to 280 inc. (180)	6311	120	29	17.4/.61	1.2	3.9
Over 280 to 360 incl. (225)	6313	140	33	23.1/.81	1.5	5.2
Over 360 to 5000 incl. (300)	NU322	240	50	60.0/2.12	4.1	13.4

Weight in Grams = .005 DB

RELUBRICATION PROCEDURE

1. Clean grease fittings.
2. Remove grease outlet plug.
3. Add recommended amount of grease. Be sure grease to be added is compatible with grease already in motor. Consult your Baldor distributor or an authorized Baldor Service Center if grease other than recommended is to be used. If motor is to be greased while running, a somewhat larger quantity of grease will have to be used. Stop when new grease appears at shaft hole in the endplate or purge outlet plug.
4. Replace plug.

SAMPLE RELUBRICATION DETERMINATION

ASSUME - NEMA 286T/(IEC 180), 1750 RPM motor driving an exhauster fan in an ambient temperature of 43° C., atmosphere moderately corrosive.

1. Table I lists 9500 hours for standard conditions.
2. Table II classifies service conditions as "severe".
3. Table III lists a multiplier of .5 for severe conditions.
4. Relubrication interval should be 9500 X .5 = 4750 hours.
5. The amount of grease to be added is 1.2 in³ or 3.9 tsp.

NOTE: Smaller bearings in size category may require reduced amounts of lubricant.

TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Motor won't start	Usually line trouble, such as single phasing at the starter.	Check source of power supply. Check overloads, fuses, controls, etc.
Excessive humming	High voltage	Check input voltage and for proper connections.
	Eccentric air gap	Have motor checked at local service center.
Motor over-heating	Overload. Compare actual amps nameplate rating.	Check for excessive friction in motor or driven equipmen Reduce load or replace motor with unit of greater capaci
	Single-phasing	Check current, all phases. Should be approximately equa
	Improper ventilation	Check external cooling fan to be sure air is moving prope through cooling fins.
	Unbalanced voltage	Check voltage, all phases. Should be approximately equal
	Rotor rubbing on stator	Check air gap clearance and bearings.
	Over voltage or under voltage	Check voltage.
	Open stator windings	Check stator resistance in all three phases for balance.
	Grounded winding	Dielectric test and repair.
	Improper connections	Recheck all connections in accordance with connection diagram.
Bearing over-heating	Misalignment	Realign motor and equipment
	Too much tension in belt drive	Reduce belt tension to a point adequate for load.
	Excessive end thrust	Reduce thrust from driven machine.
	Too much grease in bearing	Remove grease until cavity is approximately 3/4 filled.
	Insufficient grease in bearing	Add grease to bearing until approximately 3/4 filled.
	Dirt in bearing	Clean bearing and bearing cavity. Repack with correct grease.
Vibration	Misalignment	Realign motor and driven equipment.
	Rubbing between rotating and stationary parts	Eliminate cause of rub.
	Rotor out of balance	Have rotor balance check and repaired at local repair cer
	Resonance	Tune system or contact a local service center for assista
Noise	Foreign material in air gap or ventilation openings.	Remove rotor and foreign material. Replace rotor. Chec integrity of insulation. Check ventilation openings.
Growling or whining	Bad bearing	Replace bearing. Purge and replace grease.

RB/jf-8/91

THREE YEAR WARRANTY

BALDOR premium efficiency electric motors are warranted for a period of three (3) years, from the date of shipment from the factory or factory warehouse against defects in material and workmanship. Standard efficiency motors are warranted for a period of one (1) year, from the date of shipment from the factory or factory warehouse against defects in material and workmanship. To allow for stocking and or fabrication period, the warranty period will be extended for an additional period of six months of shipment date from factory or factory warehouse stock. In no case will the warranty be extended for a longer period. BALDOR extends this limited warranty to each buyer of the electric motor for the purpose of resale and to the original purchaser for use.

The Spencer Turbine Company
Windsor, CT 06095
(203) 688-8361

INSTRUCTIONS

FOR THE INSTALLATION, USE, MAINTENANCE AND DISASSEMBLY OF LOBE AIRE BLOWERS RANGE

RB 30 ÷ 220

IMPORTANT

Read and become familiar with this manual prior to uncrating and installing y Spencer Lobe Aire Blower. This precision equipment is capable of extended ser and lifespan. Realization of this potential can best be achieved through pr handling and adherence to the instructions detailed here. Damage resulting f failure to follow correct procedure will void warranty.

CONTENTS

WARRANTY:

We warrant that this product will be free from defects in material and workmanship for a period of one (1) year from date of shipment thereof. Within the warranty period, we shall repair or replace, F.O.B. Windsor, CT, such products that are determined by us to be defective.

This warranty will not apply to any product which has been subjected to misuse, negligence, or accident or misapplied or improperly installed. This warranty will not apply to any product which has been disassembled, repaired or otherwise altered by any persons not authorized by our Service Department.

The guarantee of the motor and control manufacturers will govern the extent of our guarantee on such equipment. Warranty work on motors and controls must be authorized by Spencer and must be performed in an authorized shop as designated by the motor and control manufacturers.

INSTRUCTIONS

FOR THE INSTALLATION RUNNING MAINTENACE AND DISASSEMBLY OF THE ROTARY BLOWERS RANGE

RB 30÷220

A. GENERAL INFORMATION

Read these directions carefully before installing and starting the machine: R B blowers are precision machines and all their components have been carefully checked before, during and after blower construction; they have been subjected to a severe test before shipment in order to ascertain the correct mechanical running and the correspondence with contractual specifications.

Before requesting assistance from your dealer, you are advised to read this booklet. Failure to comply with the main points of these directions, particularly those regarding lubrication, cooling, protecting against entry of foreign bodies and inadmissible over-pressures may cause damages and faulty performances not covered by the guaranty.

2. Transport and warehousing

Avoid any rough handling.

Assemblies with motor should be lifted with ropes provided with hooks to be inserted in the foundation holes in the base plate.

Do not pass the ropes under the body of the blower and of the motor; store the machine in a dry, clean place.

If the machine is left for a long time in damp surroundings, the internal and machined parts should be wet with a special rust preventing oil; before starting the machine remove the rust preventer by washing it with a suitable solvent.

B. CAPACITY ADJUSTMENT AND PLANTS LAYOUT

1. Adjustment

As the rotary blowers are positive displacement machines, **it is asbolutely not allowed** to adjust the gas capacity by throttling the flow with valves placed on suction or discharge pipe.

This adjustment has to be done by one the following ways:

— By acting on the rotation speed (forecasting the driving motor with variable rotation speed or with multiple polarity)

— By discharging in the open air the excess of air capacity thru an exhaust pipe from the discharge pipe (equip. this pipe with a valve and an air silencer)

— By recirculating the gas capacity excess through a by-pass line at the inlet. In the by-pass suction pipes a manual or automatic valve has to be fitted and a gas cooler, when necessary.

2. Plants layout

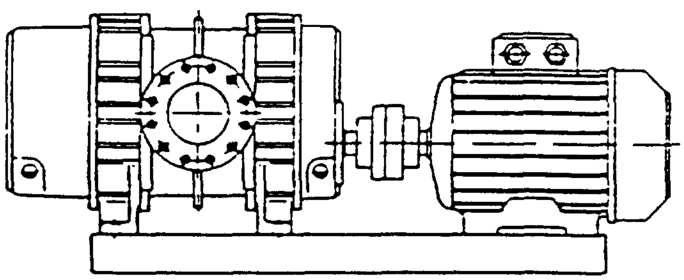
The whole piping and equipment shall be in accordance with the prescription pointed out in chapter C - INSTALLATION, and with the above prescription concerning the capacity adjustment.

In any case it is absolutely to avoid che continuous operation with continuous outflow from the safety valve.

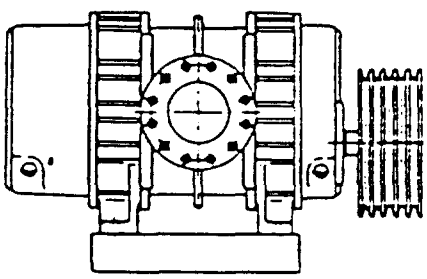
C. INSTALLATION

1. Drive

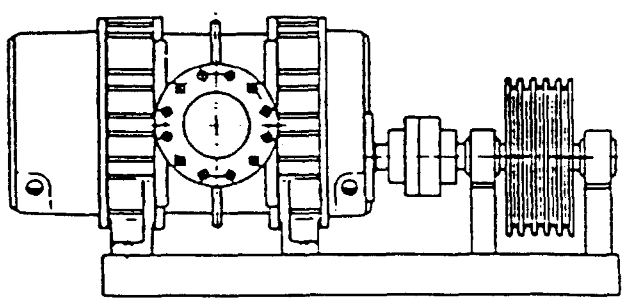
The blower may be driven by one of the following methods (fig. 1):



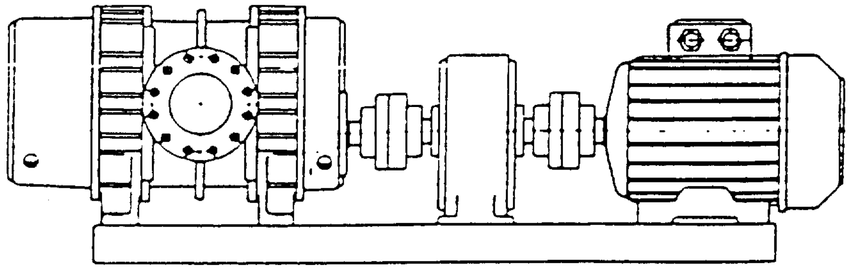
A - Direct drive by flexible coupling



B - Drive by cantilever pulley



C - Drive by pulley and countershaft



D - Drive by speed reducer or multiplier

Fig. 1 - Drive methods

2. Assembly of the coupling or pulley

The hole in the hub of the coupling or of the pulley shall be machined with H7 tolerance. Clean and oil the end of the shaft; fit the half coupling or the pulley by means of a suitable tool placed in the central hole of the shaft. Avoid absolutely any hammer blow.

3. Cantilever pulley

The blowers of the R B series are suitable for operation with a cantilever pulley till the maximum value of the differential pressure shown on the table or the diagrams. It is however advisable, in case of particularly heavy duty (continuous duty, abrupt changes in pressure a.s.o.) to limit the cantilever pulley drive to the pressure shown below:

RB 30 - 50 - 70 - 90 - 110 - 130 - 160 - 200	8 mH_2O o 800 mbar
RB 30 - 50 - 70 - 90 - 110 - 130 - 160 - 220	6 mH_2O o 600 mbar
RB 41 - 61 - 81 - 101 - 121 - 150	5 mH_2O o 500 mbar

The pulley must have a minimum pitch diameter of not less than those pointed out in the table of page 26.

4. **Direction of rotation - Air flow direction**

The horizontal blowers can rotate in either directions. The vertical blowers with top-bottom nozzles have top suction and bottom discharge air flow as standard execution (air flow from bottom to top shall be specified in the purchase order). Air flow direction in connection with direction of rotation of the blower can be taken from fig. 2.

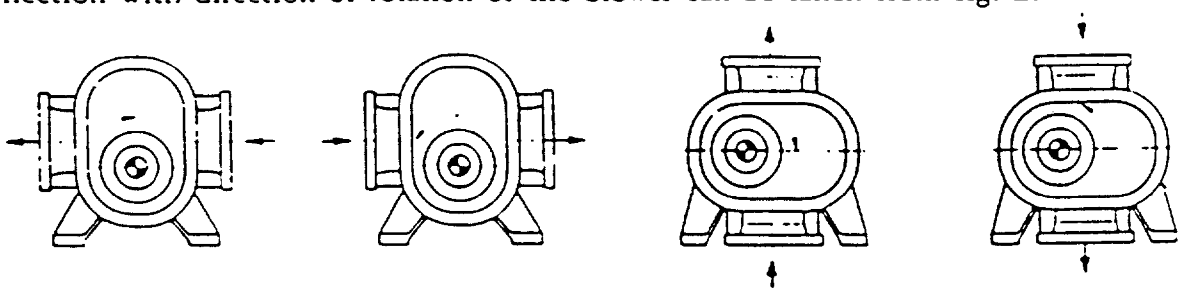


Fig. 2 - Relation between direction of rotation of the blower and the air flow direction when viewed from coupling end

5. **Installation**

The foundation shall be sufficiently stable to withstand the vibrations and solid enough to give firm support of the coupled unit on a metal base.

A layer of cork under foudations can contribute to absorb these vibrations.

As metal bases are by nature liable to become warped it is necessary to check the blower-motor alignment after that the unit has been installed.

This operation has to be carried out as shown in fig. 3 by placing a perfectly straight set square on the external alignment on the different points of the circumference. The distance between the two faces of the halves coupling should be constant; check with a thickness gauge (fig. 3).

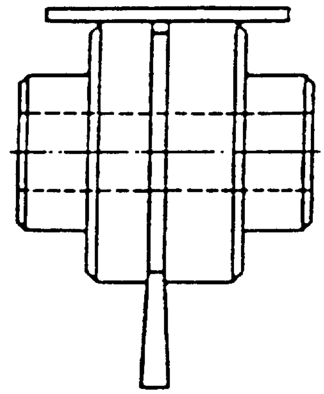


Fig. 3 - Shaft alignment check

In order to adjust the alignment place small rectangular thicknesses of metal or wedges under the base near the foundation bolts.

Repeat the alignment test after the foundation bolts have been tightenend and the pipes connected.

Regular checks should be repeated during running.

After checking the aligment and making every necessary adjustement, turn the shaft by hand - it must turn freely.

The V-belt drive should be properly aligned: the alignment has to be chechked with a rule placed on the faces of the pulleys (fig. 4).

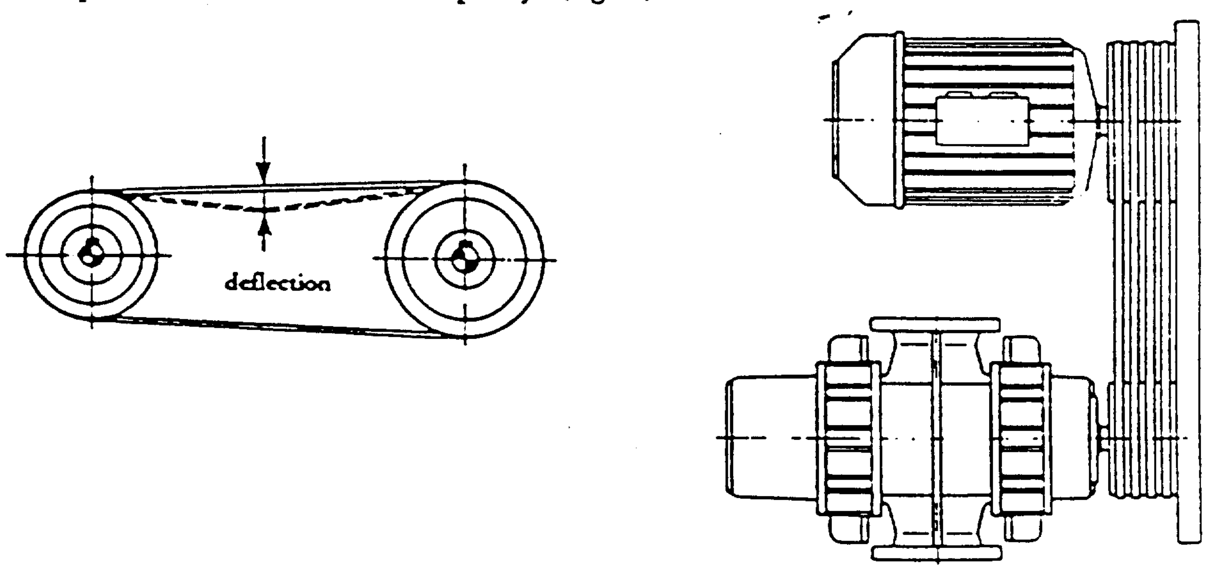


Fig. 4 - Alignment check and tension check of the belt drive

Belts tension has to be adjusted so that to allow, under the hand-pressure, the deflection of 10 mm for 1 meter of distance between the centers. From a too high belt tension may ensue damages to the blowers.

6. Pipes

The pipes shall usually have the same diameter as the blowers nozzles one; if they are very long, their diameter shall be in relation to the friction losses established when the plant was designed; avoid to add sharp angled elbows and abrupt offsets.

If the pipes are made of steel, they shall have a sufficient thickness to prevent vibration and noise.

Heavy pipes shall not rest on the casing of the blower but shall be supported separately; avoid thrust or pull of the pipes on the blower due to their faulty assembly or their thermal expansion during running.

Rubber expantion joints should be fitted.

It is extremely important not to allow any foreign bodies to enter inside the machine throught the pipes; the pipes should therefore be carefully cleaned before assembling and cleaned from any foreign body, particularly from welding spatters.

It is advisable to fit the pipes with the following ancillary equipment: air suction filter, air silencer, relief valve, non return valve, pressure guage and vacuum guage (refer to paragraph: ancillary equipment).

If there is the possibility that condensate or water entrainment be formed, it is necessary to forectast drains in the lower parts of the pipes and possibly a separator.

After the pipes have been connected the alignment and the free rotation of the shaft shall be checked again.

7. Cooling (only vertical execution)

When duty conditions require it, type «R» with water cooled covers is supplied.

Water shall flow in thru the lower cover part and flow out thru the upper part; the drain is in a free fall funnel.

The required cooling water is from 3 to 8 l/min from the smaller to the larger sizes.

to prevent any danger of cracking caused by frost, the cooling piping shall be supplied with an emptying valve.

8. Starting equipment

The electric motor must be supplied with a motor switch with suitable set temperature relays; **inadequately protected electric motors are not covered by the guaranty.**

The electric equipment shall be in a position to give to the motor the starting torque necessary to overcome the starting torque resistance.

Bear in mind that star-delta starting is not possible if at the discharge pipe there is the full pressure: in this case a relief valve or a by-pass pipe must be provided, or a method that allows to reach the running speed gradually (for example: slipring motor and starting rheostat).

D. RUNNING

1. Start up

Before starting up carry out following operation:

— Pour oil into the two sumps (see lubrication)

— Check the free rotation of the shaft; if necessary realign and remove any foreign bodies from the machine.

— Ascertain that the motor's direction of rotations causes the gas to flow in the required direction.

— Dampen the inlet air filter with oil, if it is of the damp type («DB» range); use the proper oil supplied with the same filter: pour the oil in a bac and wet the filter by turning in the oil bath.

Before being used, the damped filter shall be allowed to drip for about a day.

— Let the cooling water flow in (if the machine has a water cooling system)

— **Open all the gate valves on the suction as well as on the delivery pipe**

As soon as the blower has been started:

— Close the relief valve or the by-pass pipe if any

— Check that the pressure is not above the tag pressure

— Make sure that the machine runs smoothly without vibrations.

2. Running

During running, check regularly the following points:

— Delivery pressure; if it is above the tag pressure, it means that the blower capacity is too high or the delivery pipe diameter is not sufficient

— Depression: if it is excessive reduce the rotation speed (when possible) or adjust the vacuum by introducing in the suction chamber air from outside

— Check the regular flow of the cooling water (when used) and its outlet temperature (not above 45°C)

— Check the oil level in both sumps and if necessary top it up (see under lubrication)

— Check the oil temperature which under normal atmospheric and pressure conditions, shall not exceed 80° C ~

— Check the temperature of the stuffing boxes (if any).

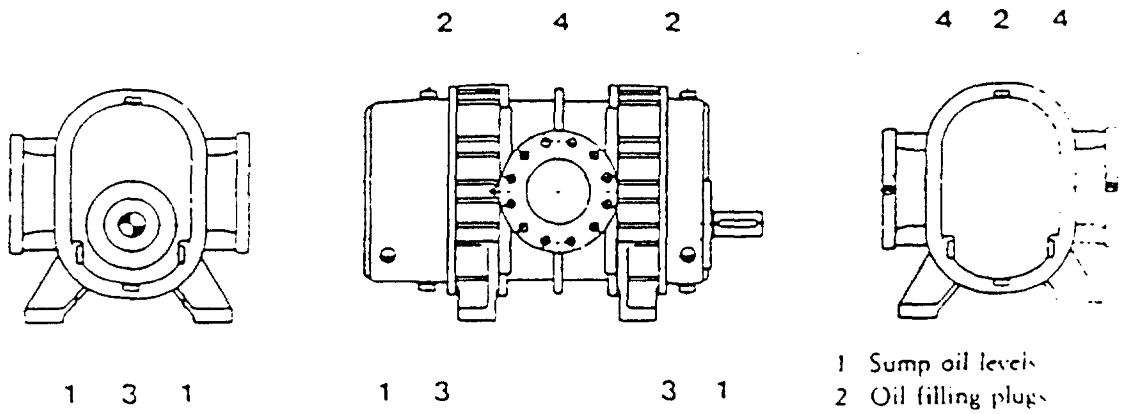
E. MAINTENANCE

1. Lubrication

The blowers are forwarded from the works without oil.

The gears and rolling bearings of the blower shall be lubricated with oil; proper disks keyed to the main shaft let the lubricant be parted also to the parts placed above in the sump.

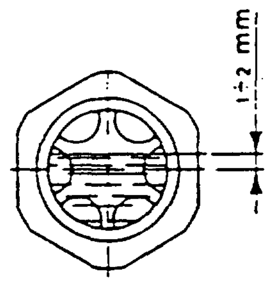
The fig. 5 shows the external parts of the blower requiring lubrication and the connections for the pressure gauge.



1 Sump oil levels
2 Oil filling plugs
3 Oil emptying plugs
4. Pressure gauge connection

Fig. 5

Oil level in the sump shall be as shown in the fig. 6. Do not overfill to avoid lubricant overheating or outflow.



by standstill blower

Fig. 6 - Oil level

REQUIRED OIL QUANTITY IN THE BLOWERS

RB Size	Vertical type	Horizontal type
30 - 40 - 41	Litri 1,2	Litri 0.7
50 - 60 - 61	» 2	» 1
70 - 80 - 81	» 3,3	» 1.5
90 - 100 - 101	» 5,5	» 2.5
110 - 120 - 121	» 7,8	» 5
130 - 140 - 150	» 14	» 8
160 - 170 -	» 26	
200 - 220 -	» 38	

Use only brand new oils; regenerated oil must not be used

Lecommanded lubricants

Make	Type
ESSO	NUTO
MOBIL	D.T.E OIL BB
SHELL	OMALA
IP	HIDRUS
BP	ENERGOL HLP
AGIP	BLASIA
ROL	ARM

Viscosity:

ISO 150 (= 8 ÷ 10° E): for normal ambient temperatur and or for oil temperature not higher than 75°C

ISO 220 (= 14 ÷ 15° E): for ambient temperature exceeding 40°C; for tropical climates; for hot gases and or for oil temperature up to 105°C

The first change of oil is carried out after 300 hours of operation with the blower switched off. Subsequent oil changes are carried out after 500 ÷ 1000 hours of operation

It is however necessary that the conditions of the oil be checked regularly, particularly when the conveyed gases may contaminate or oidate the lubricant.

2. Cooling

Use water not too hard. Calcareous deposits can endanger the efficiency of the cooling system.

If there is hard water fouling in the cooling chambers it is necessary to remove it by washing with suitable chemicals. Drain the water when the blower is not in use and there is danger of frost.

3. Blower's cleaning

If air or gases containing dust or impurities are conveyed, in the inner parts of the blower deposits or foulings may occur and endanger, beyond a certain limit, operating safety.

When cleaning the machine, use may be made of blown, steam or a solvent suitable to the deposit nature (petrol, fuel oil, kerosene, ammoniacal water, tricholoroethylene etc.).

When using air or steam, avoid producing inadmissible pressure in the casing of the blower; maximum pressures: with air 2 bar, with steam 1 bar.

Before starting again the machine, the inner parts shall be dried and cleaned of every residue.

4. Filter cleaning

A too dirty filter can cause a damaging loss of pressure and loose its filtering power. Dry filters are cleaned with a blast of blown air; when necessary change the cartridge.

Wet air filters series DB with cartridge damped with special oil need regular maintenance. The cartridge must be washed with proper solvent, dried and then damped with the right type of oil: transformers oil may also be used.
Before being used again the damped cartridge shall allowed to drip for about a day.
It is advisable to keep a spare cartridge available in order to avoid interruptions in the use of the machine.

5. **Safety valve**

Oil the valve spindle regularly.

6. **Drive**

Check regularly belt tensions and the service ability of the same; adjust the tension when necessary, replace the belts.
Check the conditions of the rubber blocks of the flexible coupling (if necessary, replace them).

7. **Seals**

The blowers in the standard execution are provided of special cast iron flexible rings which do not require maintenance. They allow a small escape of gas to the outside and it may be conveyed if required.
If gas losses increase considerably, it is necessary to replace the rings (see disassembly).

F. ANCILLARY EQUIPMENT

1. **Safety valve**

It is advisable to foresee a safety device if excessive overpressure or depression may occur. Do not place any interrupting device between the safety valve and the blower. If necessary, the safety valve may be silenced with a suitable silencer.
The safety valve shall be installed uprigth with bottom flange.

2. **Non return valve**

It should be employed, when it is necessary, to avoid gas returning from the delivery pipe.

3. **Silencer**

It is necessary to decrease the volume of noise caused by the blower and by the pipelines.
The silencer is inserted in the free side, that is to say in the suction pipe if the blower operates in compression and in the delivery pipe if the blower operates in depression. To reach better results in sound deadening, silencers on both sides may be inserted (suction and delivery pipe).
The silencer must be fitted immediately next the blower's nozzles.
If a particularly damp gas is conveyed, it is necessary to use a special silencer.

4. Air filter

Its purpose is to prevent accidental entry of foreign bodies in the machines and to keep out the air dust (if any). If possible place the filter in a room where there is little dust, extending the suction pipe if necessary.

5. Shock insulating mountings and elastic connectors

These parts operate as dampeners of vibrations.

Shock insulating mountings are necessarly used when the foundation is hallow below or consist in a metal framework. The elastic connectors may be made of rubber strips or wavy metal dampeners.

6. Ancillary equipment lay-out

As an example in the following illustrations are shown some possibilities for fitting ancillary equipment.

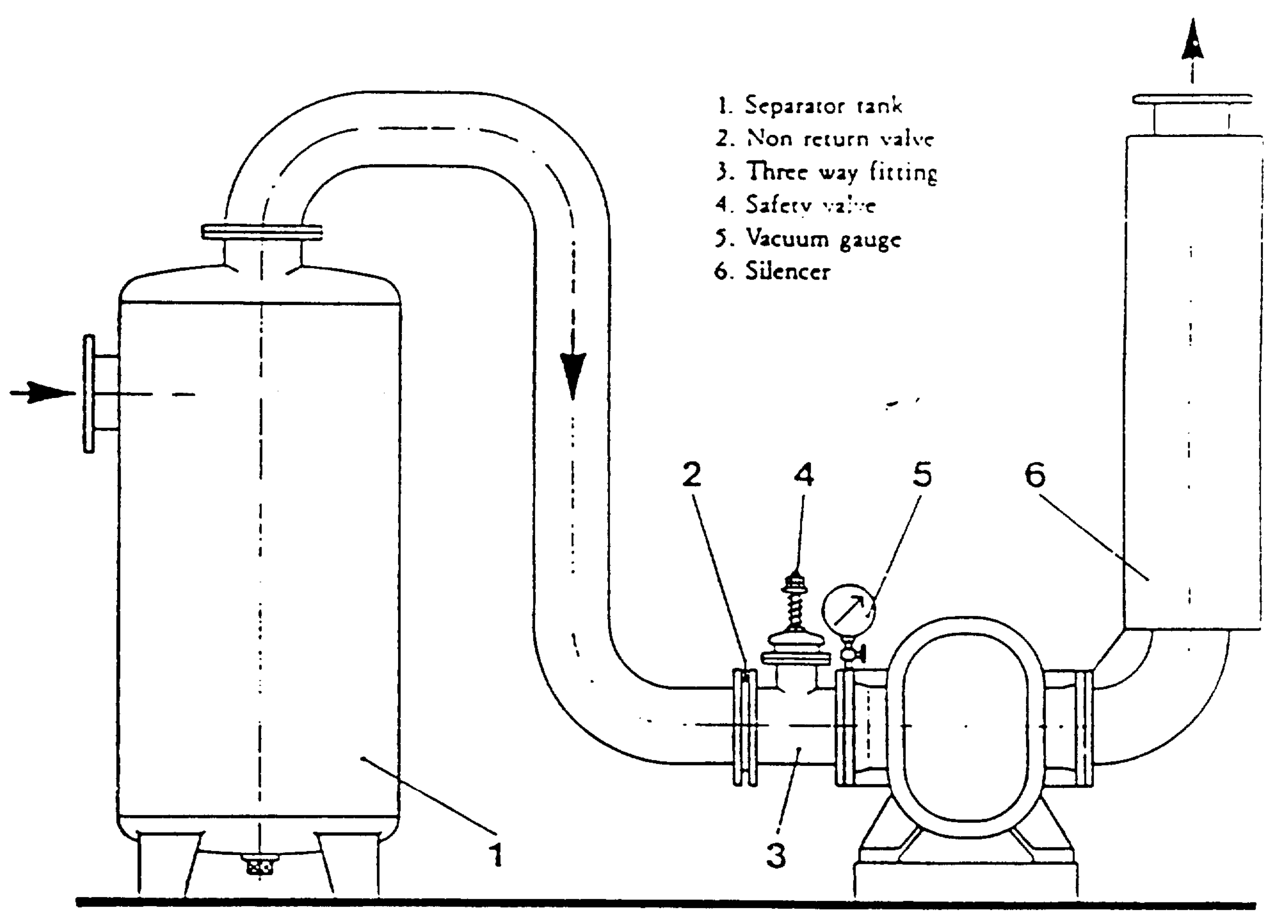
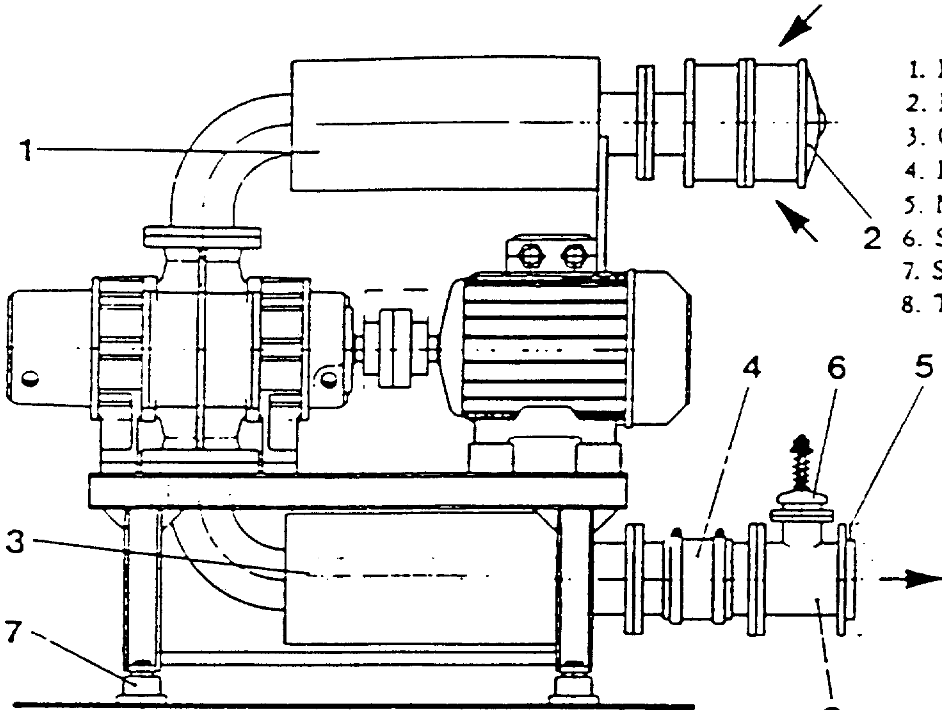
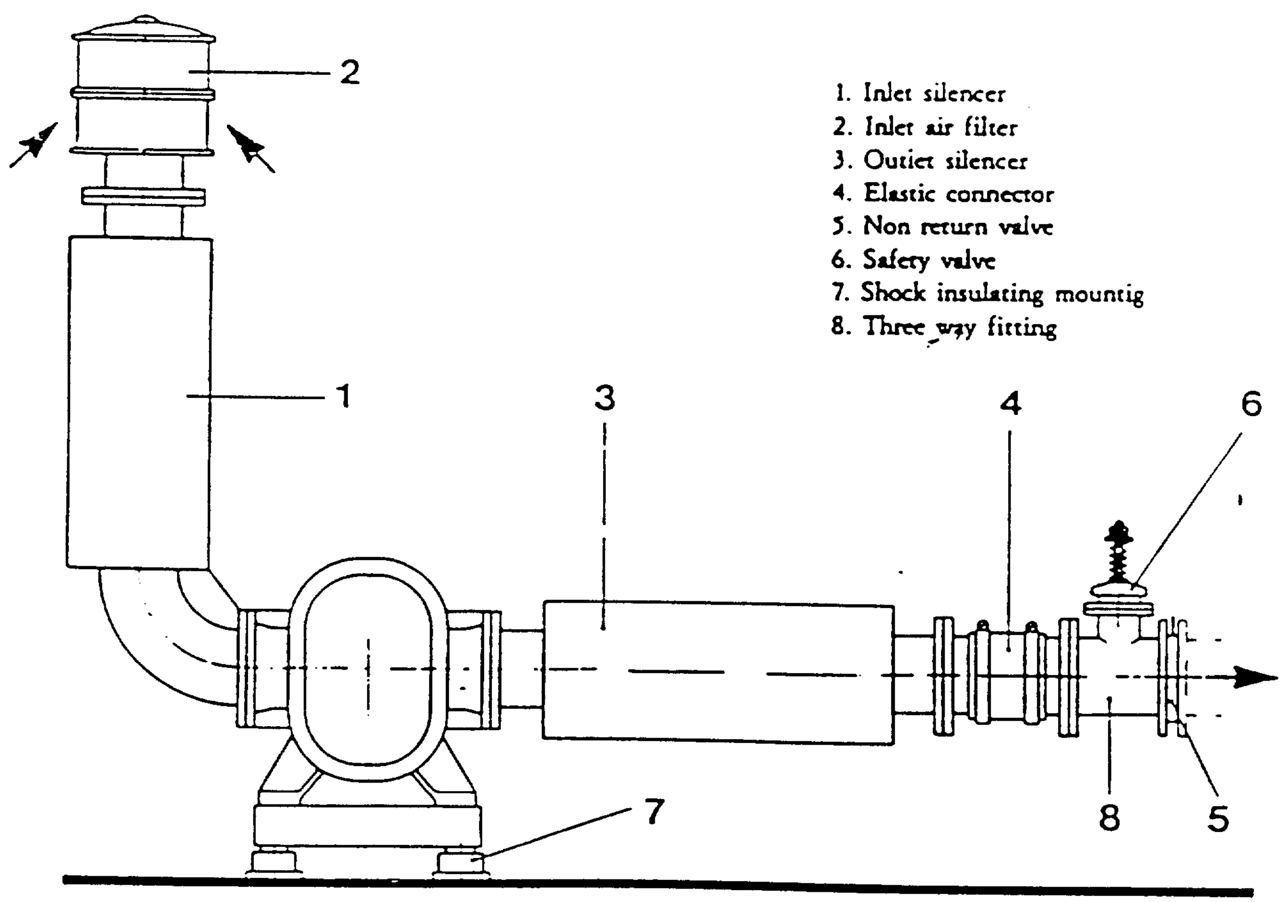


Fig. 7 - Exhauster plant



1. Inlet silencer
2. Inlet air filter
3. Outlet silencer
4. Elastic connector
5. Non return valve
6. Safety valve
7. Shock insulating mountig
8. Three way fitting

Fig. 8 - Compact execution



1. Inlet silencer
2. Inlet air filter
3. Outlet silencer
4. Elastic connector
5. Non return valve
6. Safety valve
7. Shock insulating mountig
8. Three way fitting

Fig. 8A - Blower plant example

G. OPERATING TROUBLES - CAUSES - REMEDIES

1. EXCESSIVE DISCHARGE PRESSURE

Causes	Remedies
Air capacity over the necessary amount of the plant	Reduce the rotation speed of the blower when possible; blow of in the open air or by-pass part of the gas (refer to chapter E
Obstructions or throttlings into the discharge pipe	Remove the causes of obstructions or throttlings

2. SAFETY VALVE CONTINUOUS OUTFLOW

Causes	Remedies
Excessive discharge pressure	Reduce the pressure to the allowed value
Valve setting to low in comparison with the plant pressure	Set again the valve, increasing the breathing pressure to the allowable value

3. AIR OR MACHINE OVERHEATING

It is normal the air heating of 10°C degrees, over ambient temperature for each 1000 mm W.C. (100 mbar) back pressure.

Causes	Remedies
Plants pressure higher than rated pressure	Increase discharge pipe diameter; remove possible obstructions or throttling; reduce when possible blower rotation speed; release in the open air part of compressed air
Clogged inlet air filter	Clean the filter of replace the cartridge
Too viscous lubricant oil or too high oil level	Replace the oil with another less viscous: settle the right level again
Excessive wear of rotors and consequent increase of clearances	Check the clearances; consult the manufacturer

Causes	Remedies
High room temperature due to scanty ventilation	Fan the room

4. ANOMALOUS VIBRATIONS AND NOISES
(Stop the blower immediately)

Causes	Remedies
Excessive wear of rolling bearings	Check the rolling bearings; replacement is necessary when the clearance is over the value C3
The rotors meet owing to the phase displacement as consequence of over-loads or foreign bodies entry	Check the back pressure: disassembly and replace the phase; before assembling ceck the rotors be perfectly aligned
Rotors mutual sliding or rotor - casing sliding due to foreign materials or dust	Clean the blowers; check that the covers of the casing have not been damaged
Rotors casing covers sliding due to over-theating	Verify the air filter; check back pressure: disassemble and check condition of the covers
Rotors out of balance due to deposits or foulings	Clean rotors and casing: check the rotors be aligned

5. LOW AIR CAPACITY

Causes	Remedies
Clogged inlet air filter	Clean the filter
Excessive suction depressione	Settle the stated value of the suction pressure again
Belts drive slip	Strecht the belts
Wear of the rotors with too high increase of clearances	Measure the clearances; consult the manufacturer
Gas leakages from delivery pipe	Check the delivery pipe

6. MOTOR OVERLOADING

Causes	Remedies
Differential pressure, back pressure or suction pressure too high in comparison with rated values of pressure	Act on the plant to reduce pressure to rated values
Blowers capacity too high in comparison to requested plants capacity: consequently pressure increase	Let air surplus leak in the open air or better reduce rotation speed of the blower
Clogged inlet air filter	Clean the filter
Rotating parts meeting and internal slidings	Stop the blower immediately

7. OIL LEAKAGE

Causes	Remedies
Too high oil level in the sumps and leakage from drain holes	Settle oil level as prescribed in fig. 6
Worn seal ring with leakage at the shaft end	Replace the rubber seal ring (rings) pos. 43
Worn out labirynth flexible rings	Replace the flexible rings pos. 45

H. DISASSEMBLING AND ASSEMBLING

Reasons why the stripping should take place

Abnormal noise, vibratidns, overtheating, fall in delivery, increase in the amount of absorbed power, are signs of faulty behaviour requiring disassembly, revision and possible replacement of some components.

As stripping and re-assembly requires special skill and knowledge of the operations to be carried out, it is advisable, when possible, to send the blower to the manufacturer's worksho or ask for the service of skilled personnel.

The following remarks have the purpose to give useful directions for the disassembly and re-assembly; please recall that when this operation is effected by the customer, the manufacturer cannot guarantee the result.

RB $30 \div 121$

Refer to sectional drawing page 23.

1. Disassembling

As a rule mark all parts in order to place them in their original place when reassembling: do not mix them up especially the sealing spacers part n. 25.

Place the blower on a smooth horizontal supporting surface; drain of the lubricating oil.

Start the stripping from driving side.

Remove Key 30 and the sump 12A together with the seal ring 43, and with the external ring of the bearing 31. Unscrew nut 27.

By means of the porper extraction holes, extract the cover 5A. During this operation the parts no. 55,63, 24, 16A, 23, 23A, 23C, the internal ring of bearing 31 the sleeve 37 and the bearing 32 will be removed automatically together with the cover 5A. The blower casing 1 can be now removed; everything else can be left assembled. When necessary, sump 12 B may be removed for cleaning the gears housing.

Clean carefully the inner surfaces of the blower and pay great attention not to scrate or damage the sealing surfaces; use, when necessary a suitable solvent - (see chapter «cleaning»).

2. Disassembling of the gears and rolling bearings

The gears have to be removed only when it is necessary to replace them or the rolling-bearings. The wear of the gear's teeth or the excessive clearance of the bearings can cause a decrease of the right clearances between the rotors and therefore inadmissible rubbings.

After draining off the lubricating oil and cleaning the gears, check the clearance on the teeth side; for this purpose lock one of the rotors with a metal sheet, rotate the other one and measure the clearance with a thickness gauge or a dial gauge.

The maximum clearance on the pitch diameter can be taken from clearances table page 28.

Should, after checking, the clearance between the teeth be over the maximum allowed value, the gears or the rolling bearings or both must be replaced.

The maximum allowable clearances of the rolling bearings are given by the bearings manufactures.

Before disassemblying the gears take note of the clearances between the rotors in 4 positions each at 45° from the others.

Substract from measured clearances any possible wear on the sides of the teeth.

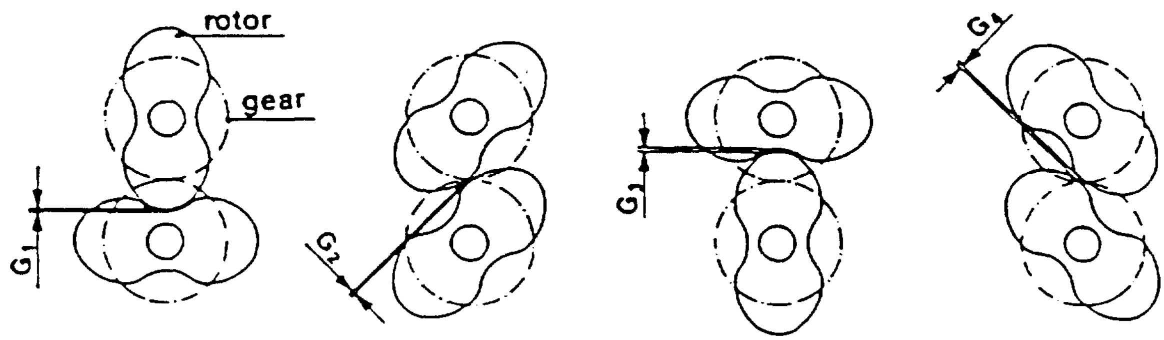


Fig. 9 - Main position of the rotors when measuring clearances

In order to strip the gears, loosen the locking nuts 26, remove the lubricating disk 16B and remove the gears by using the extraction holes; remove also the adjusting hub 19 together with the gear 11A. Helical tooth gears are extracted simultaneously.

The bearings 33 are removed only when it is necessary to replace them.

3. Assembling

Clean all parts carefully; oil the parts that need to slide on each other; remember not to live any foreign bodies or rags inside the machine during re-assembly.

Assembling is carried out as per above described steps backwards.

Pay great attention to avoid damaging the sealing surfaces, the rolling bearings and the gears. Never use force resort to hammer blows.

Assembling shall start from the cover of the driven side placed on a horizontal surface: support shall include the outer limits of the cover and allows the rotors to be mounted in a vertical position later; when reassembling the body and the other cover remember to place again in position the centering pins of the cover.

After having exactly positioned the pins 68A and 68B the covers and oil sump can be secured definitely.

This operation shall be carried out on a perfectly smooth and horizontal surface.

The external ring of the bearing no. 31 shall be fitted in its seat, after having applied a light film of sealing material type LOCTITE 641.

The driving end oil sump shall be assembled without seal ring 43 that shall be carefully inserted after having secured the sump.

The fitting of the sealing spacers 25 together with flexible rings shall be done when possible by means of a proper introducing bush (can be supplied on request).

The seal spacers 25 must have the same original lenght. For this purpose it is of primary importance that the spacers are not changed among them, but placed again in their original place.

When reassembling the gears, keep in mind that the teeth must fit in their original positions; for this purpose, please refer to the appropriate marks (fig. 10).

4. Clearances and synchronization ajustment

If the gears have been replaced or if the gear 11A has been removed from the hub 19, it is necessary to check them and to adjust the clearance between the rotors.

Fit the gears without securing definitely the adjusting hub. Check that the clearances between the rotors in the 4 main positions are the same as when they were measured during disassembling.

In all cases the clearances should not be below 0,15 mm in the smaller size and 0,64 mm in the bigger ones. Also between rotors and casing there should be some clearances which should be checked after the centering pins are in positions.

If clearance G1-G2-G3-G4 between the rotors are not the same checked before stripping, it is necessary adjust the gear 11A which must let to rotate on hub 19; secure the gear on the hub definitely after required clearances have been measured and lock with the suitable lockscrews. For a better and more safety locking of the screws it is recommended to apply on the screw thread a little quantity of cyanoacrylate adhesive «Loctite 241». This agent shall be applied before tightening the screws: after that timing has been made and the screws are temporarily tigten, extract one screw at a time and after having applied on its thread the «Loctite 241» screw it tight again.

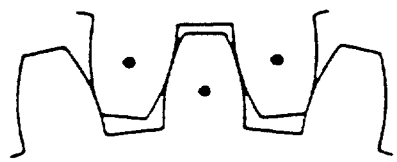


Fig. 10 - Gear fitting marks

If sealing spacers 25 of the exact original thickness have been used, the axial position of the rotors should be correct. Check and make sure that the clearance between cover and rotor from driving side be approximately the double of the clearance existing on the opposite side.

If the blower has been perfectly reassembled, the rotors should rotate freely by hand. When the machine is re-started, after re-assembling, it is necessary to keep it under control to be sure the correct and smootly running without overheatings or vibrations.

RB 130-140-150

1. Disassembling

See sectional drwg. page 24.

It is of great importance that all parts be placed, when reassembling, in their original position. It is therefore advised to mark properly all pieces, especially the adjusting washers 67.

Place the blower on a smooth horizontal surface; drain the oil. Start disassembling from driving side: remove key 30 and oil sump 12A complete with its seal ring 43.

By means of an extractor remove sleeve 37.

Take the nuts 27A and 27B off; extract the lubricating disk and the spacer 24 and remove the bearing housings 52A and 52C complete with their bearings.

At the purpose use the housings fixing screws by inserting them in the extraction holes of the bearing housing themselves.

Disassemble the cover 5 and extract casing 1; everything else can be left assembled.

If necessary disassemble also oil sump 12B in order to clean the gears housing.

Clean carefully the inner surfaces of the blower and pay great attention not to scrate or damage the sealing surfaces; at the purpose use suitable chemical agent (see chapter cleaning).

2. Disassembling of the gears and rolling bearings

See same chapter as described for RB 30 ÷ 121.

3. Assembling

Clean all parts carefully; oil the parts that need to slide on each other; remember not to live any foreign bodies or rags inside the machine during re-assembly.

Assembling is carried out as per above described steps backwards.

Pay great attention to avoid damaging the sealing surfaces, the rolling bearings and the gears. Never use force nor resort to hammer blows.

Assembling shall start from the cover of the driven side placed on a horizontal surface. support should include the outer limits of the cover and allow the rotors to be mounted in a vertical position later, when reassembling the body and the other cover remember to place again in positions the centering pins of the cover before securing the covers to the casing definitively. The required operations in securing the covers and those following should be carried out with the machine placed on a perfecty smooth horizontal surface.

The sump driving end has to be fitted without the seal ring 43: this ring has to be carefully inserted after securing the sump with the pins 68B.

Full care shall be taken during replacement of the seal rings 45; use a suitable tool which may be purchased by manufacturer's workshop.

The adjustment washer 67 must have the same length as the original one.

When reassembling the gears, keep in mind that the teeth must fit in their original positions; for this purpose, please refer to the appropriate marks (fig. 10).

Remember to replace the old oil with a new one.

4. Clearance and synchronization ajustment

If the gears have been replaced or if the gear 11A has been removed from the hub 19, it is necessary to check them and to adjust the clearance between the rotors.

Fit the gears without securing definitively the adjusting hub. Check that the clearances between the rotors in the 4 main positions are the same as when they were measured on stripping the machine.

In all cases the clearances should not be below 0,15 mm in the smaller size and 0,64 mm in the bigger ones. Also between rotors and casing there should be some clearance which should be checked after the centering pins are in positions.

If clearance G1-G2-G3-G4 between the rotors are not the same checked before stripping, it is necessary adjust the gear 11A which must let to rotate on hub 19; secure the gear on the hub definitively after required clearances have been measured and lock with the suitable lockscrews. For a better and more safety locking of the screws it is recommended to apply on the screw thread a little quantity of cyanoacrylate adhesive «Loctite 241». This agent shall be applied before tightening the screws: after that timing has been made and the screws are temporarily tigten, extract one screw at a time and after having applied on its thread the «Loctite 241» screw it tight again.

If gaskets 48-49, (for RB 130 ÷ 220 only) and washer 67 of the exact original thickness have been used, the axial position of the rotors should be correct. Check and make sure that the clearance between cover and rotor from driving side be approximately the double of the clearance existing on the opposite side.

If the blower has been perfectly reassembled, the rotors should rotate freely by hand

When the machine is re-started, after re-assembling, it is necessary to keep it under control to be sure the correct and smoothly running without overheatings or vibrations.

RB 160 ÷ 220

1. Disassembling

Follow instructions under chapter «disassembling RB 130-140-150».

2. Stripping of the gears and rolling bearings

The gears have to be stripped only when it is necessary to replace them or the rolling-bearings. The wear of the gear's teeth or the excessive clearance of the bearings can cause a decrease of the right clearances between the rotors and therefore to inadmissible rubbings.

After draining of the lubricating oil and cleaning the gears, check the clearance on the teeth side; for this purpose lock one of the rotors with a sheet-metal, rotate the other one and measure the clearance with a thickness gauge or a dial gauge.

The maximum clearance on the original diameter can be taken from clearances table page 28.

If, after checking, the clearance between the teeth is over the maximum allowed value, the gears or the rolling bearings or both must be replaced.

The maximum allowable clearances of the rolling bearings are given by the bearings manufactures.

Before disassembling the gears take note of the clearances between the rotors in 4 positions each at 45° from the others, by means of a thickness (fig. 9).

Substract from measured clearances any possible wear on the side of the teeth.

In order to strip the gears remore the lubricating disk 16 B, loose locking screws of grip rings 53 and remove the gears by using the extraction holes. Helical tooth gears are extracted simultaneously if the rotor is locked; in any case avoid damaging the teeth

The bearing 33 are removed only when it is necessary to replace them.

3. Assembling

Clean all parts carefully; oil the parts that need to slide on each other; remember not to live any foreign bodies or rags inside the machine during re-assembly.

Pay great attention to avoid damaging the sealing surfaces, the rolling bearings and the gears. Never use force nor resort to hammer blows.

Assembling shall start from the cover of the driven side placed on a horizontal surface; support should include the outer limits of the cover and allow the rotors to be mounted in a vertical position later; when reassembling the body and the other cover remember to place again in positions the centering pins of the cover before securing the covers to the casing definitively. The required operations in securing the covers and those following should be carried out with the machine placed on a perfectly smooth horizontal surface.

The sump driving end has to be fitted without the seal ring 43: this ring has to be carefully inserted after securing the sump with the pins 68B.

Full care shall be taken during replacement of the seal rings 45; use a suitable tool which may be purchased by manufacturer's workshop.

The adjustment washer 67 must have the same length as the original one.

Remember to replace the old oil with a new one.

4. **Clearances and synchronization ajustment**

If the gears have been replaced or if their position has been changed it is necessary to check and to adjust the clearances between the rotors.

Clean accurately the contact surfaces of the shaft and of the gears hub: place the grip rings in the hubs seats and fit the gears onto the shafts. Do not tighten the gear 11A of the driving shaft.

The timing of the rotors will be achieved by turning the gear 11A on its shaft till reaching the same clearances found during disassembling, for all four main positions of the rotors. However, the clearances should not be below of 0,15 mm for the small blower sizes and 0,64 for the bigger ones. Also between rotors and casing there should be some clearances which should be checked after the centering pins have been positioned. Once the given clearences have been achieved, tighten the screws of the grip rings 53 till reaching the wrench setting torque MS given below.

If gaskets 48-49, (for RB 130 - 220) washers 67 (for RB 130 - 220) of same thickness of the original ones have been used, the axial position of the rotors should be correct. Check and make sure that the clearance between cover and rotor from driving side be approximately the double of the clearance existing on the opposite side.

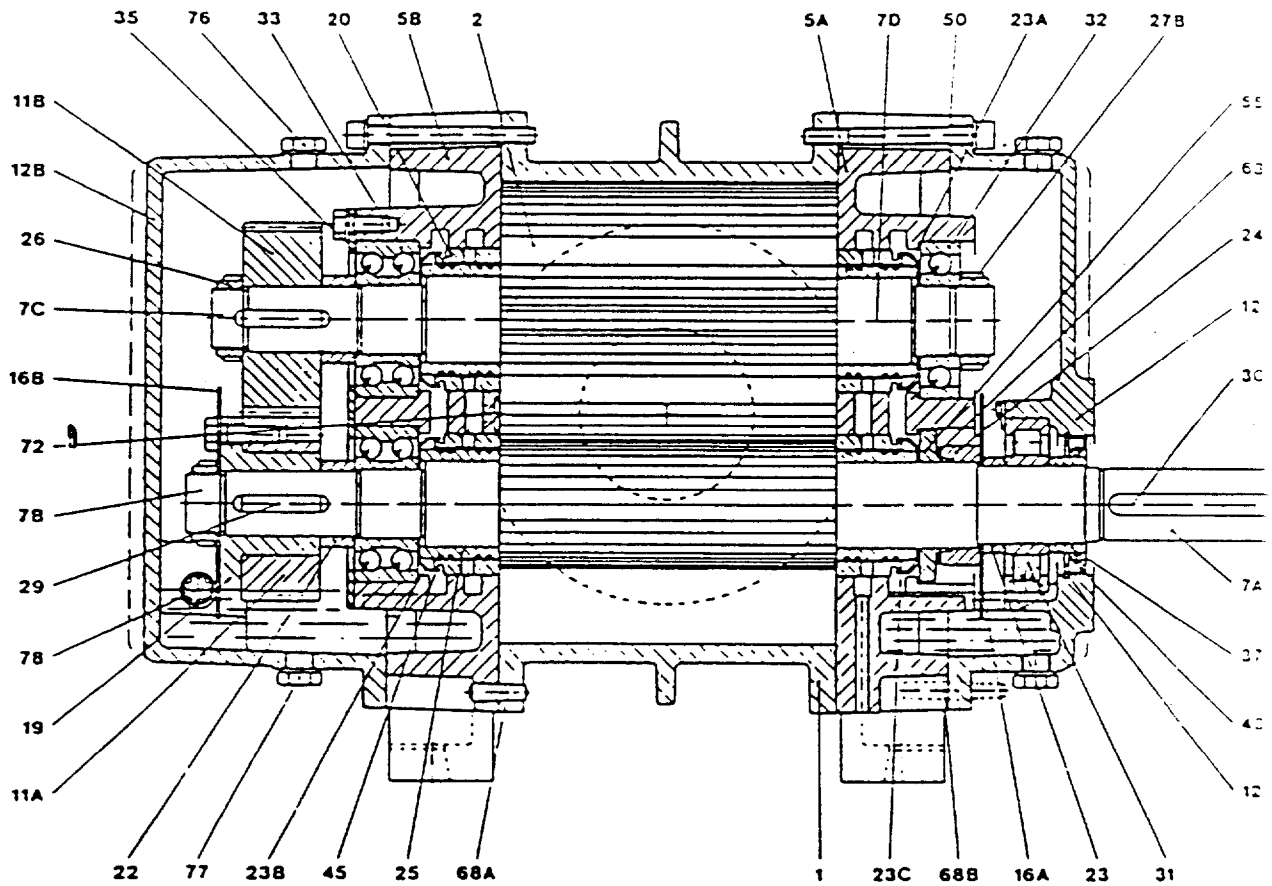
If the blower has been perfectly reassembled, the rotors should rotate freely by hand. When the machine is re-started, after re-assembling, it is necessary to keep it under control to be sure the correct and smoothly running without overheatings or vibrations.

WRENCH SETTING TORQUE

Blower type	Torque (kgm)
RB 160	8,2
RB 170	8,3
RB 200	14,5
RB 220	14,5

RB 30—121

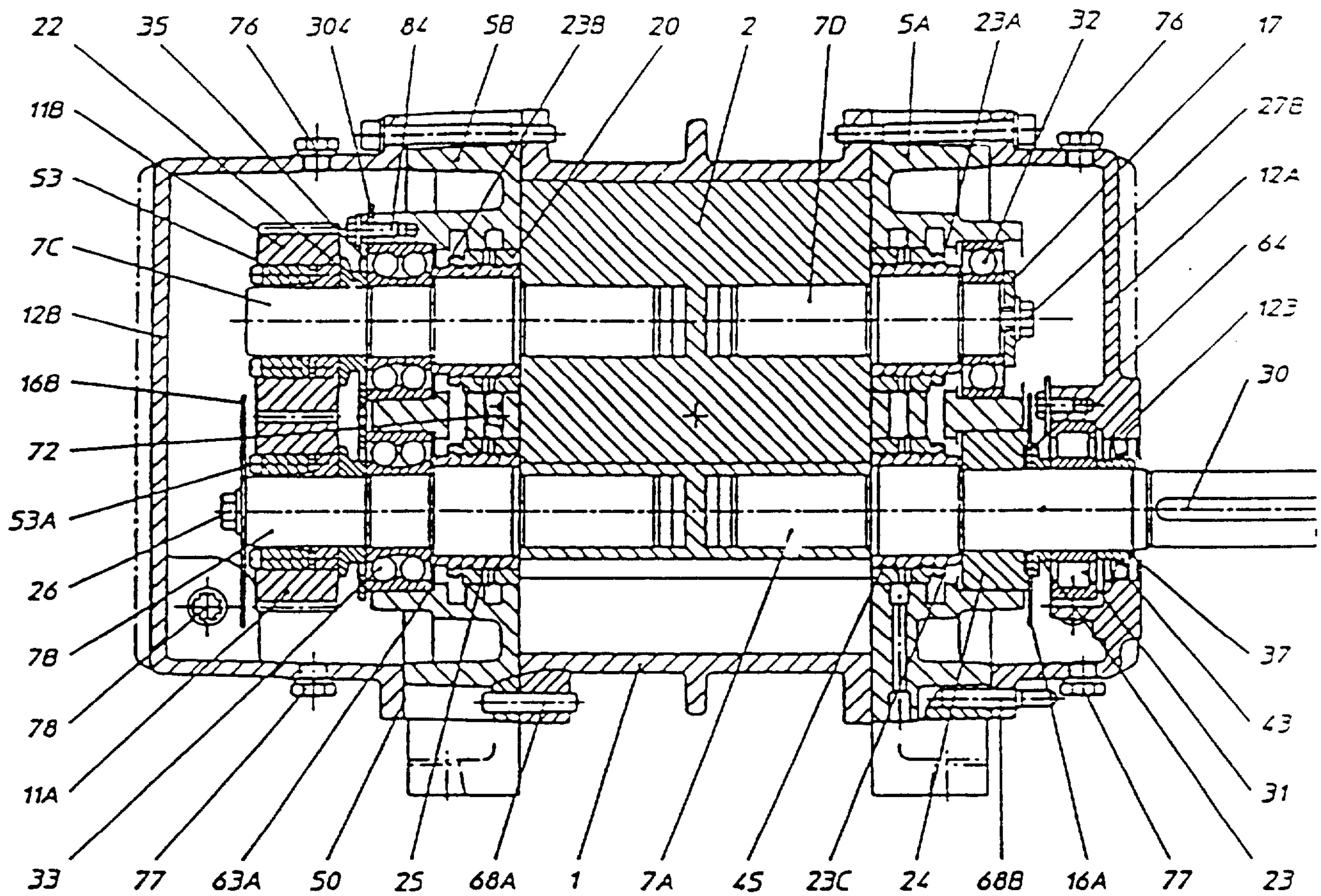
sectional drawing with parts description



No of parts	Part. N.	PART DESCRIPTION
1	1	Casing
2	2	Rotor
1 - 1	5A 5B	Cover
1 - 1	7A-7B	Shaft
1 - 1	7C-7D	Shaft
1	11A	Driving gear
1	11B	Driven gear
1 - 1	12A-12B	Sump
1 - 1	16A-16B	Lubricating disk
1	19	Gear adjusting hub
4	20	Sealing chamber
2	22	Gear spacer
1	23	Bearing spacer
1	23A	Oil splash disk
2	23B	Oil splash disk
1	23C	Oil splash disk
1	24	Disk spacer
4	25	Sealing spacer
2	26	Gear locking nut
1	27B	Bearing locking nut

No of parts	Part. N.	PART DESCRIPTION
2	29	Key
1	30	Key
1	31	Rolling bearing
1	32	Rolling bearing
2	33	Rolling bearing
2	35	Bearing cover
1	37	Shaft sleeve
1	43	Seal ring
16	45	Flexible piston ring
2	50	Gasket
1	55	Compensating rings spacer
3	63	Compensating rings
4	68A	Centering pin
2	68B	Centering pin
2	72	Plug
2	76	Oil filling plug
2	77	Oil draining plug
4	78	Oil level plug
1	123	Circlip

SECTIONAL DRAWING WITH PARTS DESCRIPTION (RB 30 C ÷ 101 C)

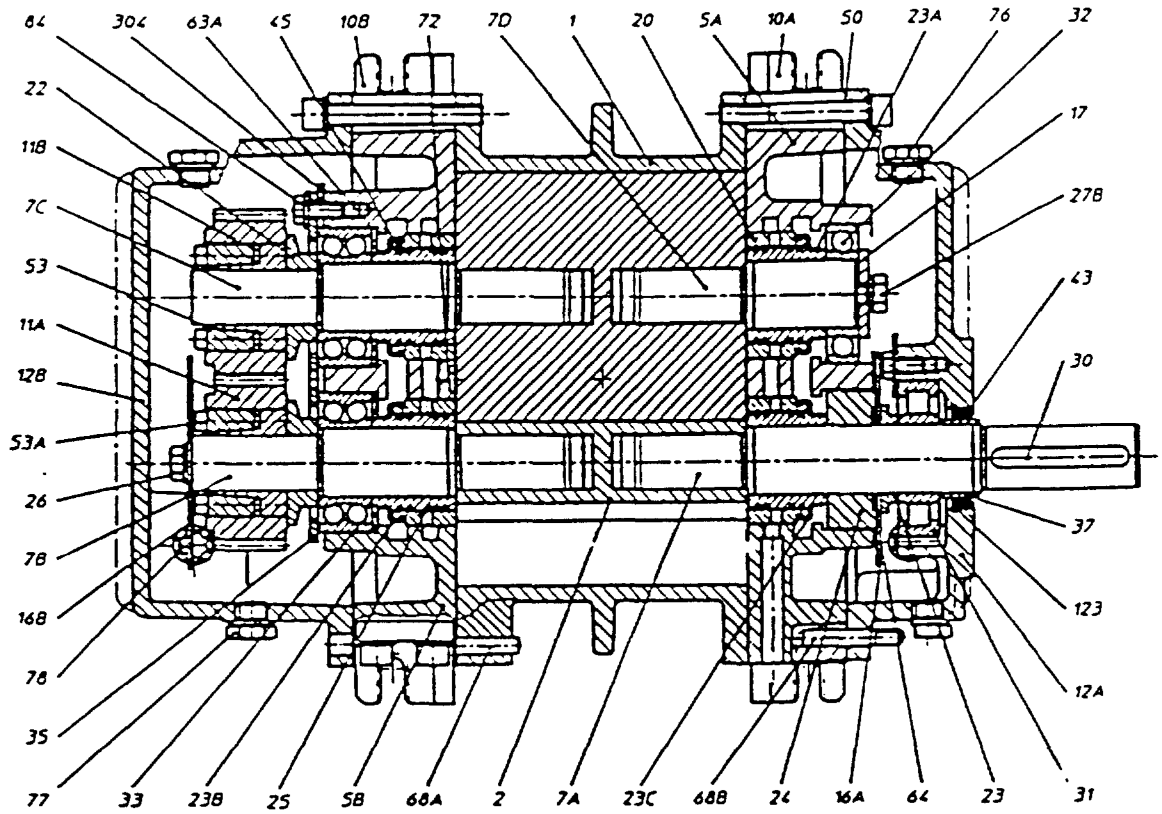


No OF PARTS	PART. N.	PART DESCRIPTION
1	1	Casing
2	2	Rotor
1	5A	Cover
1	5B	Cover
1	7A	Shaft
1	7B	Shaft
1	7C	Shaft
1	7D	Shaft
1	11A	Driving gear
1	11B	Driven gear
1	12A	Oil sump - drive side
1	12B	Oil sump - driven side
1	16A	Lubricating disk - drive
1	16B	Lubricating disk - driven
1	17	Bearing lock disk
4	20	Sealing chamber
2	22	Gear spacer
1	23	Bearing spacer
1	23A	Oil splash disk
2	23B	Oil splash disk
1	23C	Oil splash disk
1	24	Spacer - lubricating disk
4	25	Sealing spacer
1	26	Screw

No OF PARTS	PART. N.	PART DESCRIPTION
1	27B	Screw
1	30	Key
1	31	Bearing
1	32	Bearing
2	33	Bearing
1	35	Bearing cover
1	37	Internal ring
1	43	Seal ring
16	45	Flexible ring
2	50	Gasket
2	53	Gear locking rings
	53A	Screw
6	63A	Compensating ring
2	64	Bellev. washer
4	68A	Taper pin
2	68B	Threaded pin
2	72	Plug
2	76	Oil filling plug
2	77	Oil draining plug
4	78	Oil level plug
4	84	Screw
1	123	Circlip
4	304	Regulation plate

RB 30 D – 101 D

sectional drawing with parts description



No OF PARTS	PART. N.	PART DESCRIPTION
1	1	Casing
2	2	Rotor
1	5A	Cover
1	5B	Cover
1	7A	Shaft
1	7B	Shaft
1	7C	Shaft
1	7D	Shaft
2	10A	Right foot
2	10B	Left foot
1	11A	Driving gear
1	11B	Driven gear
1	12A	Oil sump - drive side
1	12B	Oil sump - driven side
1	16A	Lubricating disk - drive
1	16B	Lubricating disk - driven
1	17	Bearing lock disk
4	20	Sealing chamber
2	22	Gear spacer
1	23	Bearing spacer
1	23A	Oil splash disk
2	23B	Oil splash disk
1	23C	Oil splash disk
1	24	Spacer - lubricating disk

No OF PARTS	PART. N.	PART DESCRIP
1	26	Screw
1	27B	Screw
1	30	Key
1	31	Bearing
1	32	Bearing
2	33	Bearing
1	35	Bearing cover
1	37	Internal ring
1	43	Seal ring
16	45	Flexible ring
2	50	Gasket
2	53	Coneclamping ele
	53A	Screw
6	63A	Compensating rir
2	64	Bellev. washer
4	68A	Taper pin
2	68B	Threaded pin
2	72	Plug
2	76	Oil filling plug
2	77	Oil draining pluc
4	78	Oil level plug
4	84	Screw
1	123	Circlip
4	304	Regulation plate

Spencer

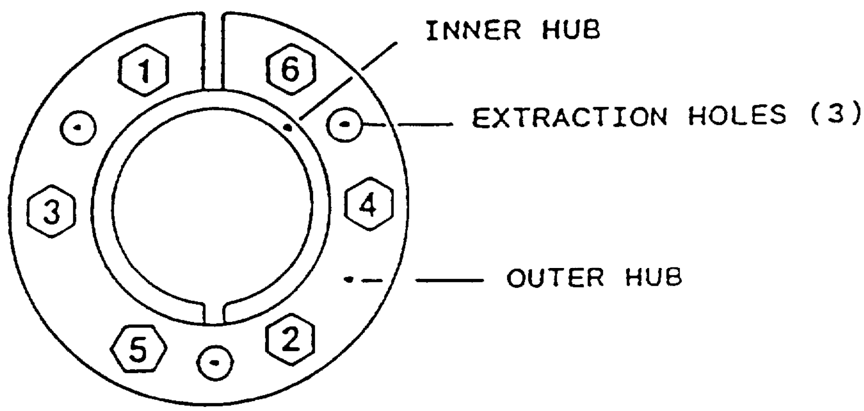
SUPPLEMENT TO INSTRUCTION MANUAL

"C" AND "D"

SERIES ROTOR TIMING:

Fasten gear 11B to shaft 7C by tightening 53A to screws approximately 1/2 torque value, using cross sequence tightening (see sketch).

TYPICAL HUB CONSTRUCTION



When completed, finish tightening all screws of gear 11B to full torque (see table).

Mount gear (11A) on shaft (7B) and tighten all 53A screws finger tight. Position rotors so that clearance values shown in "E" on clearance page are obtained. Feeler gauge is required. With rotors in this position, tighten (11A) gear clamp screws in the sam manner as (11B); check to be sure timing has not shifted during timing process.

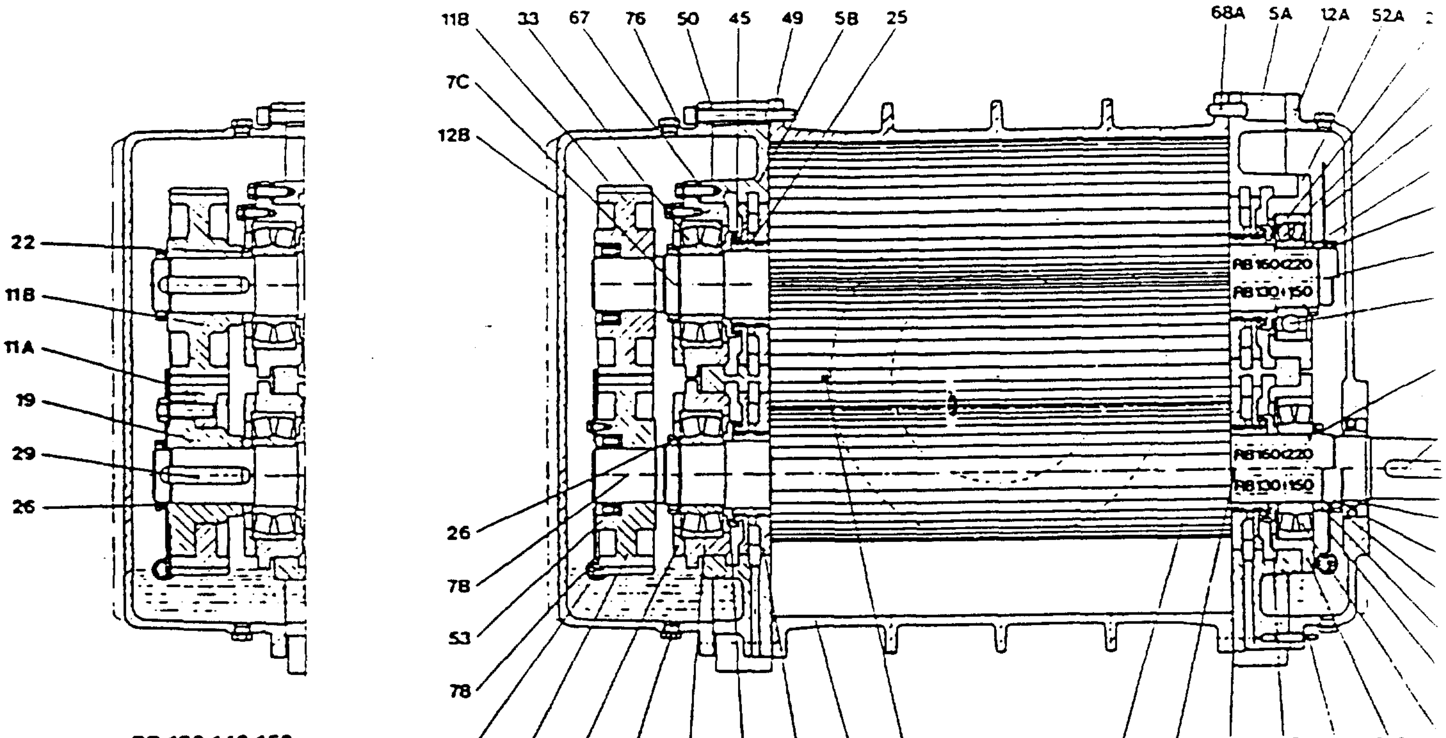
Reinstall oil slinger (16B) lock disk and screw 26, gasket (50) and oil sump (12B); refill both oil sumps to proper level.

TORQUE VALUES: 53A SCREWS

MODEL SERIES	SCREW QTY	MAX TORQUE FT-LBS
30 - 40 - 41	6	13
50 - 60 - 61	9	13
70 - 80 - 81	6	30
90 - 100 - 101	6	30

RB 130—150 RB 160—220

sectional drawing with parts description

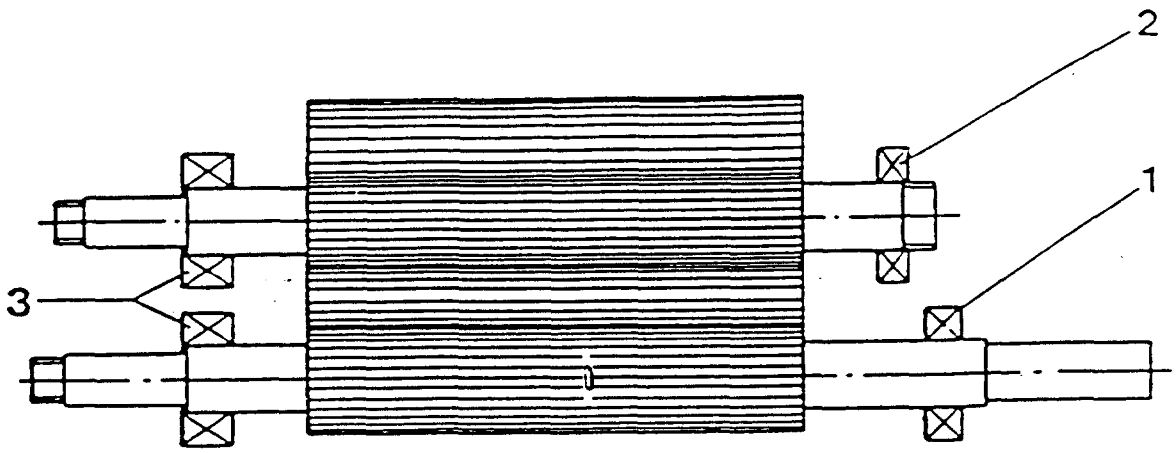


Referred to RB 130-140-150

No of parts	Part. N.	PART DESCRIPTION
1	1	Casing
2	2	Rotor
2	5AB	Cover
1	7A	Shaft
1	7B	Shaft
1	7C	Shaft
1	7D	Shaft
1	11A	R. driving gear
1	11B	L driven gear
1	12A	Sump
1	12B	Sump
1	16A	Lubricating disk
1	16B	Lubricating disk
1	19	Gear adjusting hub
4	20	Sealing chamber
2	22	Gear spacer
1	23A	Oil splash disk
2	23B	Oil splash disk
1	23C	Oil splash disk
1	24	Disk spacer
4	25	Sealing spacer
2	26	Bearing locking nut
1	27A	Bearing locking nut
1	27B	Bearing locking nut

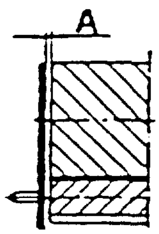
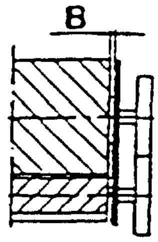
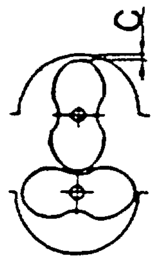
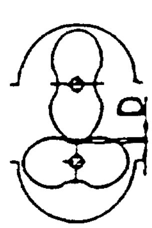
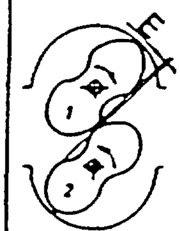
No of parts	Part. N.	PART DESCRIPTION
2	29	Key
1	30	Key
1	31	Bearing
1	32	Bearing
2	33	Bearing
2	35	Bearing cover
1	37	Internal ring
1	43	Seal ring
16	45	Flexible piston ring
1	48	Gasket
1	49	Gasket
2	50	Gasket
1	52A	Bearing carrier
2	52B	Bearing carrier
1	52C	Bearing carrier
2	53	Cone clamping element
	67	Adjusting washer
	68A	Centering pin
	68B	Centering pin
2	72	Plug
2	76	Oil filling plug
2	77	Oil draining plug
4	78	Oil level plug
1	122	Circlip

LIST OF BEARINGS



BLOWER TYPE	BEARING 1	BEARING 2	BEARING 3
RB 30 - 40 - 41	NU 307E - C3	6207 - C3	3207 - C3
RB 50 - 60 - 61	NU 309E - C3	6308 - C3	3308 - C3
RB 70 - 80 - 81	NU 311E - C3	6309 - C3	3309 - C3
RB 90 - 100 - 101	NU 313E - C3	6311 - C3	3311 - C3
RB 110 - 120 - 121	NU 315E - C3	6314 - C3	22314 - C3
RB 130 - 140 - 150	21319 - C3	6317 - C3	22317 - C3
RB 160 - 170	23222 - C3	21319 - C3	22319 - C3
RB 200 - 220	23226 - C3	21322 - C3	22322 - C3

CLEARANCES TABLE

TYPE	A1	A2	B1	B2	C	D	E	F
								
	A Rotor Cover driving side 1/100 mm		B Rotor Cover gear side 1/100 mm		C Rotor Body 1/100 mm	D Rotor Rotor T position 1/100 mm	E Rotor Rotor 45° position 1/100 mm	F Gears side side 1/100 mm
	A 1	A 2	B 1	B 2				
RB 30	14-16	20-22	9-11	19-21	10-12	12-20	12-20	4- 7
RB 40	14-16	20-22	9-11	19-21	10-12	12-20	12-20	4- 7
RB 41	18-21	25-28	9-11	19-21	12-15	15-25	15-25	4- 7
RB 50	20-23	25-30	10-12	20-22	11-13	20-25	20-25	5- 8
RB 60	20-23	25-30	10-12	20-22	11-13	20-25	20-25	5- 8
RB 61	25-28	32-37	10-12	20-22	12-14	20-30	20-30	5- 8
RB 70	25-28	32-37	15-18	25-28	16-18	20-30	20-30	7-10
RB 80	25-28	32-37	15-18	25-28	16-18	20-30	20-30	7-10
RB 81	33-38	40-45	15-18	25-28	17-19	20-35	20-35	7-10
RB 90	38-43	45-50	25-30	35-40	19-22	20-35	20-35	8-12
RB 100	40-45	47-52	25-30	35-40	19-22	20-35	20-35	8-12
RB 101	45-50	52-57	25-30	35-40	19-22	25-35	25-35	8-12
RB 110	45-50	60-65	35-40	15-18	22-28	25-35	25-35	9-13
RB 120	45-50	60-65	35-40	15-18	22-28	25-35	25-35	9-13
RB 121	50-55	65-70	35-40	15-18	22-28	30-40	30-40	9-13
RB 130	60-65	95-100	40-45	15-18	25-33	35-45	35-45	10-14
RB 140	60-65	95-100	40-45	15-18	25-33	35-45	35-45	10-14
RB 150	60-65	95-100	40-45	15-18	25-33	35-45	35-45	10-14
RB 160	70-75	100-105	45-50	15-18	37-43	35-60	35-60	10-16
RB 170	70-75	100-105	45-50	15-18	37-43	35-60	35-60	10-16
RB 200	75-80	105-110	50-55	18-20	37-45	35-50	35-50	10-16
RB 220	75-80	105-110	50-55	18-20	37-45	35-50	35-50	10-16

REMARKS:

A1 B1: Clearance measured at assembled machine and with shaft end placed horizzontally

A2: Clearance to be obtained during assembling in case the gasket casing/cover driving side is available on the blower; otherwise A2 = A1

B2: Clearance to be obtained during assembling and during the setting of the length of the sealing spacer 25 gears side and with shaft placed vertically facing upwards.

AEON™
PD Positive Displacement
BLOWER LUBRICANT

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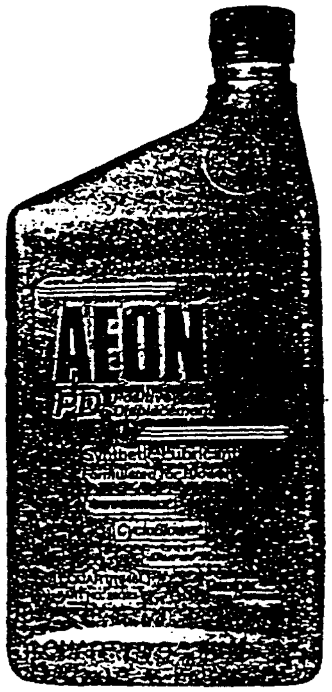
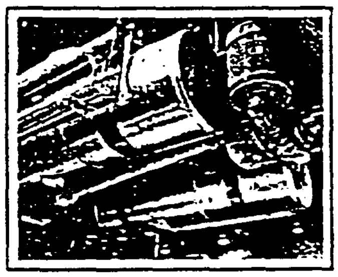
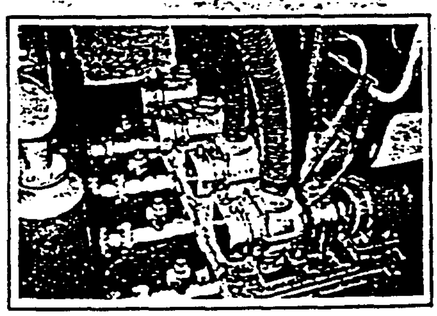
AEON™ PD Positive Displacement BLOWER LUBRICANT







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A synthetic lubricant specially formulated to provide maximum protection for all positive displacement blowers including Sutorbilt®, Gardner Denver®, and Duroflow® lines of blowers. AEON PD synthesized hydrocarbon fluid properties offer numerous advantages over mineral based oils.

FACTORY RECOMMENDED

- Extended lubricant life.
- Exceeds blower manufacturers recommendations.
- Contains additives for greater corrosion protection.
- High viscosity reduces friction and energy consumption.
- Reduced operating temperatures extend blower life.
- Compatible with most seal materials.
- Fewer oil drain and service intervals reduces maintenance cost.
- Unequalled lubrication in severe cold weather.
- Superior protection in high temperature environments.
- Maximizes blower cleanliness and minimizes blower wear.

FACTORY TESTED

PROPERTIES	AEON PD
Viscosity	
...at 40°C, cSt	225
...at 100°C, cSt	26.4
...at 100°F, SUS	1165
...at 210°F, SUS	131
Pour Point °F/°c	-50/-45.6
Flash Point °F/°c	460/238

NFPA HAZARD ID: Health: 0 Flammability: 1 Reactivity 0

FACTORY APPROVED

AEON PD LUBRICANT	
PACKAGE SIZE	PART #
1 Quart	28G23
12-1 Quart	28G24
5 Gallon	28G25
55 Gallon	28G28

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Models 30520-0XXX

List $978.75 Net 832.00

SELF-PRIMING PUMPS

FEATURES

Pump Type: Pedestal Pump
Body: 316 Stainless Steel
Impeller: Neoprene, Nitrile or Viton*
Shaft Seal: Mechanical, Carbon-on-Ceramic or Tungsten Carbide; Nitrile or Viton
Ports: 1" NPT Internal
Shaft: 316 Stainless Steel
Weight: 8.5 lb (3,9kg) Approx.

Models 30520-0XXX

APPLICATIONS

INDUSTRIAL: Circulating and transferring, velocity-mixing, pumping machine tool coolants, spill return, sump drainage, chemicals, pharmaceuticals, soap, liquors, ink, dyes, alcohol, dilute acids, tanning liquors, glycerine, brine, etc.

PHARMACEUTICAL: Processing medicines, lotions and preparations. Filtering pharmaceutical solutions. Filling line supply pump.

PAPER PROCESSING: Transferring and applying starches, sizes, etc. Circulating and processing wood pulp slurries.

FOOD, BEVERAGE & DAIRY: Transfer brines, vinegar, syrups during processing, liquids containing solids in suspension such as chopped tomatoes, nuts, etc. Removal of distillery wort and brewery slop. Processing viscous materials such as peanut butter, mayonnaise, ketchup, honey, etc. (low speed). Pumping whiskey, wine, rums, juices and ciders.

AGRICULTURAL: Transferring liquid fertilizers, herbicides and pesticides.

WARNING: Do not pump flammable liquids as explosion may result causing property damage, severe personal injury or death.

OPERATING INSTRUCTIONS

1. INSTALLATION – Pump may be mounted in any position. The rotation of the pump shaft determines the location of the pump's intake and discharge ports. (Refer to dimensional drawing.) Pump is normally assembled at factory for clockwise rotation (looking at end cover). If counter clockwise rotation is desired, follow steps 1 and 2 of disassembly and step 9 of assembly instructions to change direction of impeller blade deflection under cam.
2. DRIVE – Belt or direct with flexible coupling.
   Belt Drive: Overtight belt load will reduce pump bearing life.
   Direct Drive: Clearance should be left between drive shaft and pump shaft when installing coupling. Always mount and align pump and drive shaft before tightening the coupling set screw.
   If pulley or coupling must be pressed on shaft, remove end cover and impeller to support shaft from impeller end during press operation. Do not hammer pulley or coupling on shaft; this may damage bearing or seal.

   Capacitor start motor is required to overcome starting torque of impeller.

WARNING: Exposed pulley and belts can cause injury, install shield around pulleys and belts.

VARIATIONS AVAILABLE

MODEL	DESCRIPTION
30520-0001	Standard Pressure, Neoprene Impeller, Carbon Seal
30520-0003	Standard Pressure, Nitrile Impeller, Carbon Seal
30520-0004	Standard Pressure, Viton Impeller, Carbon Seal
30520-0011	High Pressure, Neoprene Impeller, Carbon Seal
30520-0013	High Pressure, Nitrile Impeller, Carbon Seal
30520-0014	High Pressure, Viton Impeller, Carbon Seal
30520-0101	Standard Pressure, Neoprene Impeller, Tungsten Carbide Seal
30520-0103	Standard Pressure, Nitrile Impeller, Tungsten Carbide Seal
30520-0104	Standard Pressure, Viton Impeller, Tungsten Carbide Seal
30520-0111	High Pressure, Neoprene Impeller, Tungsten Carbide Seal
30520-0113	High Pressure, Nitrile Impeller, Tungsten Carbide Seal
30520-0114	High Pressure, Viton Impeller, Tungsten Carbide Seal

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3. SPEEDS – 100 RPM to the maximum shown in the performance curves. For longer pump life, operate at lowest possible speeds. Lower speeds are required for viscous liquids. Consult the factory for proper speed and H.P. requirements.
4. SELF-PRIMING – Primes at low or high speeds. For vertical dry suction lift of 10 feet, a minimum of 800 RPM is required. Pump will produce suction lift up to 22 feet when wet.
   BE SURE SUCTION LINES ARE AIRTIGHT OR PUMP WILL NOT SELF-PRIME.
5. RUNNING DRY – Unit depends on liquid pumped for lubrication. DO NOT RUN DRY for more than 30 seconds. Lack of liquid will damage the impeller.
6. DISCHARGE LINE – When transferring liquids further than 25 feet, use one size larger discharge line than discharge port size.
7. CHEMICAL COMPATIBILITY – Consult the Chemical Resistance Guide in the JABSCO Industrial Pump Catalog (available upon request from ITT Jabsco) or factory for proper body materials and impeller compounds. If corrosive fluids are handled, pump life will be prolonged if pump is flushed with a neutralizing solution after each use or after each work day. A Tungsten Carbide Seal variation is available for pumping liquids that contain abrasives or are highly corrosive.
8. PRESSURES – Consult Performance Curves for maximum recommended pressures for pumps in continuous operation. If pressures exceed those shown, consult the factory.
9. TEMPERATURES – The operating temperature limits of the pump depends on the impeller compound. The following range apply: Neoprene - 45° to 180°F (7° to 82°C), Nitrile - 50° to 180°F (10° to 82°C), Viton - 60° to 180°F (15° to 82°C).
10. IMPELLER TORQUE – The torque required to initiate rotation of a new impeller in a dry pump body is:
    Standard Pressure Impeller (14282-Series):
    Forward = 4.8 pounds force - feet
    Reverse = 11.2 pounds force - feet
    High Pressure Impeller (8840-Series):
    Forward = 7.9 pounds force - feet
    Reverse = 16.3 pounds force - feet
    These values may vary slightly due to impeller compounding, blade set, and body material of construction. Consult Factory for more information.
11. SPARE PARTS – To avoid costly shut downs. Keep a spare JABSCO impeller, seal and O-ring set on hand.

SERVICE INSTRUCTIONS

DISASSEMBLY

1. Remove the four end cover screws. Remove end cover and O-ring.
2. Remove the four screws holding the body to bearing housing flange. Slide body, complete with impeller and wearplate, from pedestal and shaft assembly.
3. Remove mechanical seal by inserting two screwdrivers behind seal collar, and gently lever collar and gently lever collar and seal assembly forward on shaft. Use extreme care not to mar shaft surface. Remove seal seat and rubber cup from recess in wearplate.
4. From the drive end of the bearing housing, pry out bearing seal by inserting a screwdriver blade between OD of the seal and housing. Remove retaining ring. Very carefully withdraw shaft and bearing assembly.
5. Remove inner bearing seal and retaining ring.
6. To remove bearings from shaft an arbor press is required. If an arbor press is not available then a bearing extractor may be used. Supporting inner race of bearing, apply a steady pressure on shaft until bearing slide free. Repeat this procedure to remove second bearing.

ASSEMBLY

1. To replace bearing on shaft. Support ball bearing on its inner race and locate shaft onto bearing. Apply a steady pressure to shaft until bearing locates against shoulder on shaft. Repeat for second bearing.
2. Fit retaining ring and bearing seal into impeller end of bearing housing. Spring on bearing seal to face outwards.
3. Apply bearing grease around and between bearings, filling cavity between bearings two thirds full. Smear grease on shaft where bearing seal locates. Push shaft and bearing assembly into bearing housing.
4. Replace retaining ring and outer bearing seal with spring facing outwards.
5. Replace mechanical seal by sliding spacer onto shaft up to locating shoulder, then smear shaft with light lubricating oil. Push on seal gently until it engages with spacer. Fit rubber cup and seal seat into wearplate.
6. Insert impeller in pump body, fit O-ring in each end of the pump body. Fit wearplate to body.
7. Slide wearplate and body assembly over shaft, position wearplate in housing. Fit body to pedestal with screws. Torque screws to 60 in. lbs.

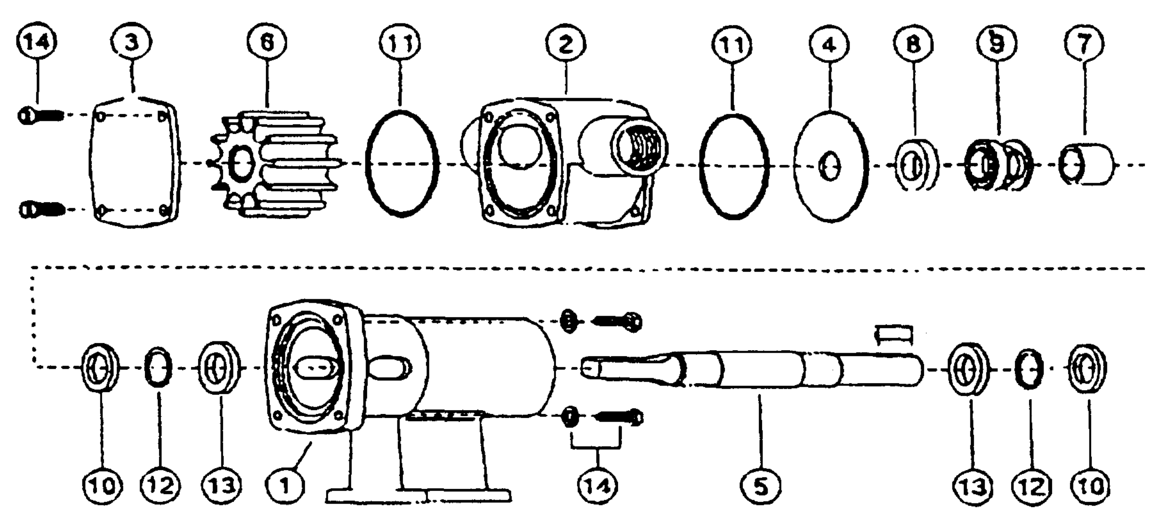
Note: A gap should be maintained between bearing housing and body.
DO NOT overtighten screws.

8. Fit end cover and end cover screws. Torque screws to 60 in. lbs.
9. Changing Pump Rotation (looking at end cover):
   Clockwise Rotation: Insert impeller into pump body with blades bending counterclockwise.
   Counterclockwise Rotation: Insert impeller into pump body with blades bending clockwise.

PARTS LIST

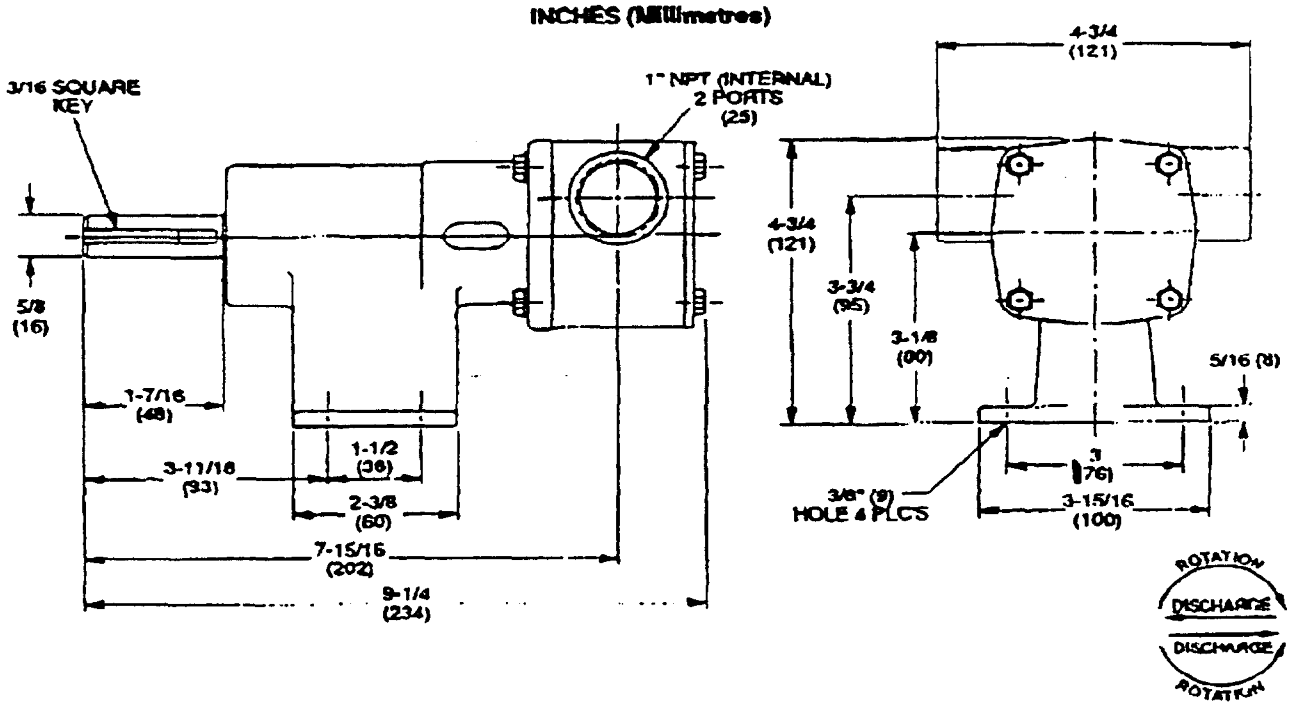
KEY	DESCRIPTION	QTY. REQ.	PART NO.
1	Bearing Housing	1	18753-0184
2	Body	1	18753-0189
3	End Cover	1	18753-0195
4	Wearplate	1	18753-0200
5	Shaft	1	18753-0205
6	Impeller:	1	
	Standard Pressure - Neoprene		14282-0001
	Standard Pressure - Nitrile		14282-0003
	Standard Pressure - Viton		14282-0004
	High Pressure - Neoprene		8840 0005
	High Pressure - Nitrile		8840-0006
	High Pressure - Viton		8840-0004
7	Spacer: Carbon	1	18753-0225
	Tungsten Carbide		18753-0226
8	Seal Seat: Nitrile	1	18753-0235
	Viton		18753-0236
9	Seal Mech.: Carbon - Nitrile	1	18753-0245
	Carbon - Viton		18753-0246
	Tungsten Carbide - Nitrile		18753-0247
	Tungsten Carbide - Viton		18753-0248
10	Bearing Seal	2	18753-0258
11	O-Ring: Nitrile	2	18753-0263
	Viton		18753-0264
12	Retaining Ring	2	18753-0270
13	Bearing	2	18753-0274
14	Screw Kit: consist of Screws, Hex Hd. M6 x 20mm (4) Screws, Hex Hd. M6 x 20mm (4) Washers, Flat M6 (4)	1	18753-0281

EXPLODED VIEW

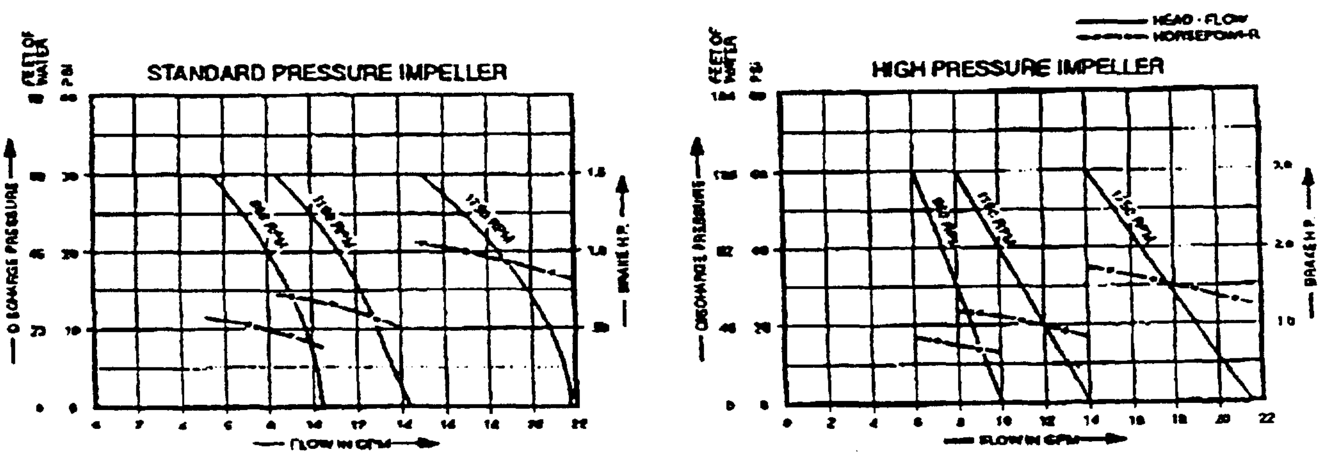


DIMENSIONAL DRAWINGS

INCHES (Millimetres)



PERFORMANCE CURVES



NOTE: Curves shows approximate head-flow for new pumps with neoprene impeller pumping water.
Capacities should be reduced approximately 10% with nitrile and viton impellers.

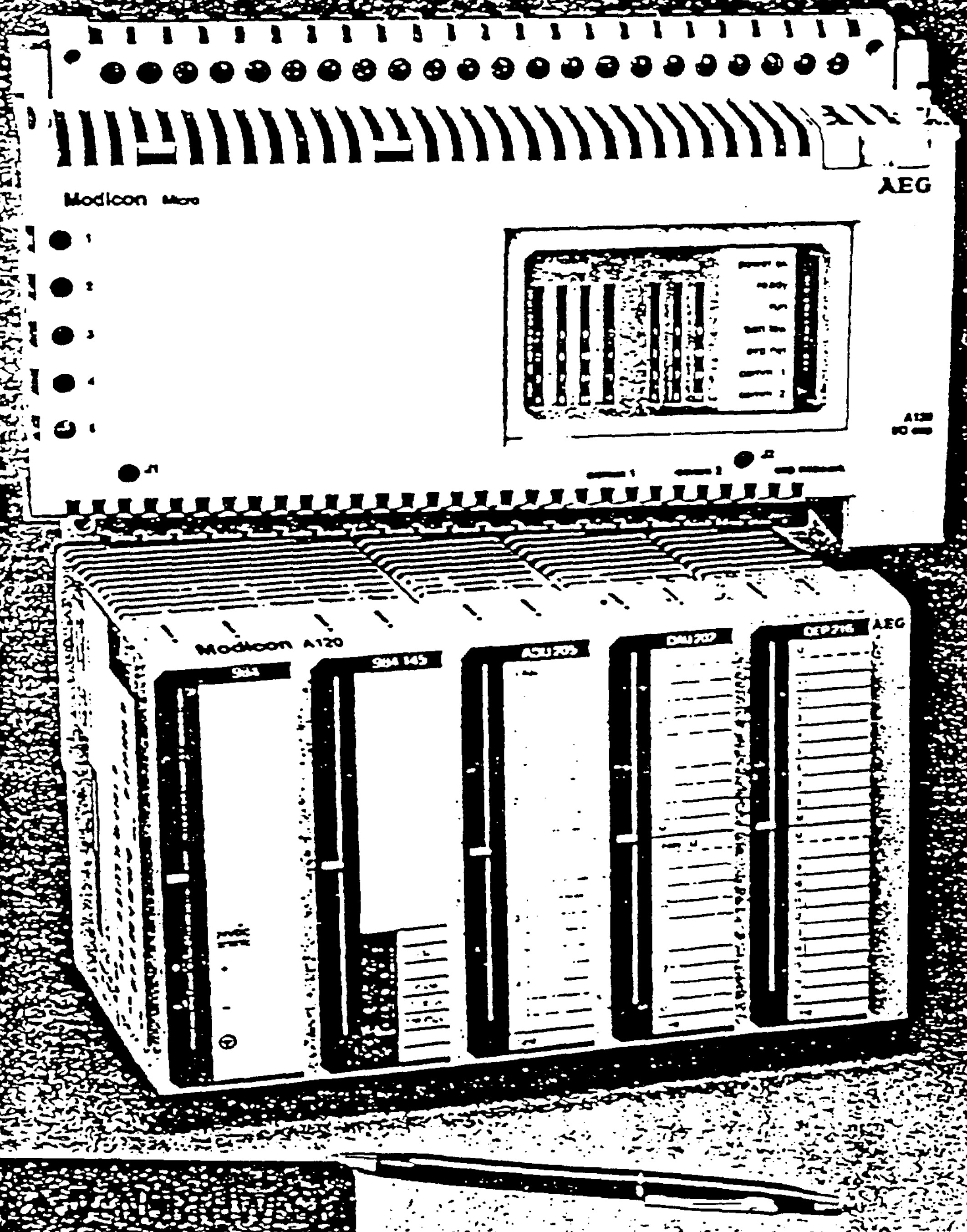
THE PRODUCTS DESCRIBED HEREIN ARE SUBJECT TO THE JABSCO ONE YEAR LIMITED WARRANTY, WHICH IS AVAILABLE FOR YOUR INSPECTION UPON REQUEST.

ITT JABSCO
A Unit of ITT Corporation
1485 Dale Way, P.O. Box 2158, Costa Mesa, CA 92628-2158, Telephone: (714) 545-8251
Bingley Road, Hoddesdon, Hertfordshire EN11 0BU England, Telephone: +44-992-467191

 Form: 43000-0513 Rev.10/91

Modicon Micro/Modicon 984-120 Compact
Advanced micro PLC technology for today and tomorrow

AEG



Ge∆mat

CPU Specifications

984-120 Compact Controllers

Controller Model	Memory (Words) Logic*	Registers	Total	Scan Time	Ports Modbus Port	Modbus+ Port	Input/Output Maximum I/O Series	Discrete I/O	Total Bits** I/O	Total Drops	# Local Racks
PC-A984-120	1.5k	1920	3.5k	5 ms/k	1	N/A	A120	256 any mix	512/512	1	4
PC-A984-130	4k	1920	6k	5 ms/k	1	N/A	A120	256 any mix	512/512	1	4
PC-A984-131	4k	1920	6k	5 ms/k	2	N/A	A120	256 any mix	512/512	1	4
PC-A984-141	8k	1920	10k	5 ms/k	2	N/A	A120	256 any mix	512/512	1	4
PC-A984-145	8k	1920	10k	5 ms/k	1	1	A120	256 any mix	512/512	1	4

*Includes memory configuration and I/O Traffic Cop. (888 words minimum - 1k words maximum)
**Includes analog in/out at 16 bits each plus discrete in/out at one bit each.

Micro Controllers

Model (110-)	Memory (Words) Logic	Registers	Scan Time	Input/Output Maximum A120* Discrete I/O	Total Bits** In/Out	Ports Modbus /ASCII Ports	I/O Expansion Link	A120 Series I/O Expansion	Expansion Total A120 Racks	Total Micros on Expansion Link
CPU 311 00 CPU 311 01 CPU 311 02 CPU 311 03 CPU 411 00 CPU 411 01 CPU 411 02 CPU 411 03	1k	400	4.25 ms/k	None	512/512	1	1 port	No	None	5
CPU 512 00 CPU 512 01 CPU 512 02 CPU 512 03 CPU 612 00 CPU 612 03	2k	1820	2.5 ms/k	256 any mix	512/512	2	1 port	Up to 15 modules	3 subracks added to Micro	5 in addition to A120 I/O expandability of the Parent CPU

I/O Specifications

A120-Series I/O

Model	Voltage Range (Max Current/Point)	Number Input Points	Number Output Points	Number per Common	I/O Power Required mA @ 5V Internal	Required Addressing I/O Bits
Discrete Input						
AS-BDEP-208	230 VAC	8	0	8	<30	8/0
AS-BDEP-209	115 VAC	8	0	8	<30	8/0
AS-BDEP-210*	115 VAC (compatible w/solid-state devices)	8	0	8	<30	8/0
AS-BDEP-218*	115 VAC	16	0	8	<60	16/0
AS-BDEP-216	24 VDC	16	0	8	<15	16/0
AS-BDEP-220	24 VDC fast response	16	0	8	<15	16/0
AS-BDEO-216	24 VDC non-isolated	16	0	8	<15	16/0
Discrete Output						
AS-BDAP-204	Relay NO (2A)	0	4	1	<60 150 @ 24 V ext.	0/8
AS-BDAP-208	Relay NO (2A)	0	8	1	<15 280 @ 24 V ext.	0/8
AS-BDAP-209	115 VAC (1A)	0	8	8	<88	0/8
AS-BDAP-210*	24-230 VAC (1A)	0	8	4	<88	0/8
AS-BDAP-218*	24-230 VAC (.5A)	0	16	8	<175	0/16
AS-BDAP-216	24 VDC (0.5A)	0	16	8	<50	0/16
AS-BDAO-216*	24 VDC (0.5A) non-isolated	0	16	16	<20	0/16
Combo Discrete						
AS-BDAP-212	24 VDC in/relay out	8	4	8/1	<15,200 @ 24 V ext.	8/8
AS-BDAP-220	24 VDC in/24 VDC, 2A, output	8	8	8/8	<60	8/8
Analog Input						
AS-BADU-204	± 500 mV, pt 100, 11 bit	4	0	4	<30	64/0
AS-BADU-205	± 10 V, ± 20 mA, 11 bit	4	0	4	<30	64/0
AS-BADU-206*	0-10 V, 0-1 V, 0-20 mA, 12 bit ± 10 V, ± 20 mA, 11 bit 4-20 mA, 12 bit	4	0	4	<100, typ 70 @ 24 V ext.	80/16
Analog Output						
AS-BDAU-202	± 10 V, ± 20 mA, 11 bit	0	2	2	<60, <150 @ 24 V ext.	0/32
AS-BDAU-208*	± 10 V, 11 bit	0	8	8	<30, 120 @ 24 V ext.	0/128
Intelligent						
AS-BZAE-201	High speed counter 50 kHz @ 24 V, 500 kHz @ 5 V, Relay NO, 2A output	1	2	1/1	<100, <30 @ 24 V ext. Sensor PS @ 5 V & 24 V ext.	48/48
AS-BZAE-204*	High speed counter one 1-10 kHz, three 1 kHz, 5/24 V Four outputs 24 V, 0.5A	4	4	4	<100, 130 @ 24 V ext.	96/16
AS-BMOT-201	Single axis Motion Incremental Encoder in ± 10 V out	5	1	5/1	<300mA, 200mA @ 24 VDC	96/96
AS-BMOT-202	Single axis Motion Resolver and Incremental Encoder in/DNP out	5	1	5/1	<600mA, 200mA @ 24 VDC	96/96
Special						
AS-BNUL-200	Module for prewiring up to 16 pt spare slot	N/A	N/A	N/A	0	0/0
AS-BNUL-202	16 pt, <50 V (6A) wiring connection mux	N/A	N/A	N/A	0	0/0
AS-BSIM-216	Discrete simulator reqs 24 VDC Discrete Input	N/A	N/A	N/A	0	0/0
AS-BSIM-203	Analog simulator reqs Analog in and out	N/A	N/A	N/A	0	0/0

*Module requires upgraded PC-A984-xxx controller.

ᵓrogramming Software Specifications

Modsoft Lite
On-line/Off-line Development Software

Description:

Modsoft Lite Development Software:	On-line/Off-line/ Documentation Software Package For Support of Modicon Micro and 984-120 Compact Controllers
	Includes: 2 System Disks - 5.25" format System Disk - 3.5" format Quick Reference Guide Modsoft Lite User Manual 984 Systems Manual
Controllers Supported:	All Micro All 984-120 Compact
ᵓmmunication Networks Supported:	Modbus RTU Mode (COM1 or COM2) Modbus ASCII Mode (COM1 or COM2) Modbus Plus (SA-85)
Editors:	Configuration Traffic Cop Ladder Logic Reference Data
Documentation Features:	
Element Comments	Two 10-char Tags Plus 50-Char Comment
Segment Comments	One 20-char Tag Plus 1500-char Comment
Ladder Lister Features:	Selected Ladder Diagram Symbol Table - Alphanumeric Symbol Table - Alphabetic Coil Cross Reference Unused References Configuration/I/O Map Page Headers/Footers Importable to Desktop Publisher
Required Hardware:	IBM PC/XT, AT or compatible ☐ DOS 3.0 or greater ☐ 640 k RAM memory ☐ Hard Disk w/1.5 Mbyte available

Custom Loadable Support Software

Part Numbers

Custom Loadable Support Software	SW-AP98-GDA
User Manual	GM-CLSS-001

Support

Host compatibility	IBM Compatible DOS 3.0 or later
Host size	640K memory, hard disk with 2 megabytes free
Host software	Microsoft Development tools including C Compiler Ver. 5.1 or Assembler Ver. 5.0 OR IBM C/2 Compiler Ver. 1.1 Linker Ver. 3.61 or later Library Manager Ver. 3.08 or later Make Ver. 4.06 or later Codeview Ver. 2.10 or later (optional)

Drum Sequencer (DRUM/ICMP)

Part Numbers

DRUM and ICMP Loadables	SW-SAx9-001, SW-AP98-SDA
Configuration Software for host computer	SW-SASI-001
User Manual	GM-0984-SAS

Support

Host compatibility	IBM Compatible DOS 3.0 or later
Host size	640K memory, hard disk with 2 megabytes free
Host software	No special requirements

Event Alarm Recording System (EARS)

Part Numbers

EARS Loadable and Host MMI Software	SW-AP9D-EDA
User Manual	GM-EARS-001

Support

Host compatibility	IBM Compatible DOS 3.0 or later
Host size	640K memory, hard disk with 2 megabytes free
Host software	No special requirements

Engineering Unit Conversion and Alarming (EUCA)

Part Numbers

EUCA Loadable	SW-EUCA-D8L
User Manual	GM-EUCA-001

Support

Programmer software	Modsoft or other software that supports loadables

984 Health Status (HLTH)

Part Numbers

HLTH Loadable	SW-HLTH-D8L
User Manual	GM-HLTH-001

Support

Programmer software	Modsoft or other software that supports loadables

Features summary

Modicon Micro

Basic 984 Instructions

Language	• Ladder Logic/ Function Block
Basic Instructions	• Relays–NO, NC, Transitional • Timers–1.0, 0.1, 0.01 second • Counters–Up, Down
Arithmetic	• 4-digit Add, Sub, Mult, Div • 4-digit BCD Values
Data Transfer	• Register-to-Table • Table-to-Register • Table-Table • Block Move • First-In, First-Out • Search, Status
Matrix	• Logical AND, OR, Exclusive OR • Compare and Complement
Bit Operations	• Bit Modify, Bit Sense, Bit Rotate, and Sequencer/ Drum Control
Program Optimization	• Skip • Constant Sweep/Single Sweep • Subroutine • Counter, Timer, Interrupt
Communication	• Simple ASCII

Enhanced 984 Instructions

Arithmetic	• Double Precision Math Add, Sub, Mult, Div • Floating Point Math Add, Sub, Mult, Div, Compare, Sq Root • Trigonometric Sin, Cos, Tan, Deg-to-Rad, Rad-to-Deg • PID2
Data Transfer	• Table-to-Block • Block-to-Table
Communication	Checksum

Memory

Battery backup	Lithium battery for 1 year
Capacitor backup	72 hours typical
Non-volatile (loads on power-up)	Internal Flash RAM
Time-of-Day Clock (not on CPU 311)	± 8.0 sec/day 0-60°C

Environmental

Temperature, Operating	0-60°C
Humidity, Operating	0-95% non-condensing
Temperature, Storage	− 40 - + 85°C
Humidity, Storage	0-95% non-condensing
Altitude	15,000 feet (4500 m)
Shock	15 G's, 11 msec, 3 pulses/ axis
Vibration	10-62 Hz: 0.075 mmDA 60-500 Hz: 1 g
Dimensions	141.5 mm H × 254 mm W × 76 mm D 5.57 in. H × 10 in. W × 3 in. D
Agency Approval	VDE, UL, CSA

Power Requirements

Integral AC Power Supply Input (Full Load)	115 VAC @ .4 A or 230 VAC @ .2A
Output	24 VDC @ 150 mA for DC inputs 5 VDC @ 250 mA for A120 I/O Expansion
Integral DC Power Supply Input (Full Load)	24 VDC @ .8 A
Output	5 VDC @ 250 mA for A120 I/O Expansion

Communications

Modbus	
Speed	9,600 Bits per second
Mode	Master-Slave: RTU or ASCII
Nodes	247 (Media dependent)
Media	Twisted Pair or Telephone

Modicon 984-120 Compact

Instructions

Language	• Ladder Logic/Function Block
Basic Instructions	• Relays–NO, NC, Transitional • Timers–1.0, 0.1, 0.01 second • Counters–Up, Down
Arithmetic	• 4-digit Add, Sub, Mult, Div • 4-digit BCD Values • Double Precision Math Add, Sub, Mult, Div • Floating Point Math Add, Sub, Mult, Div, Compare, Sq Root • Trigonometric Sin, Cos, Tan, Deg-to-Rad, Rad-to-Deg • PID2
Data Transfer	• Register-to-Table • Table-to-Register • Table-Table • Block Move • Table-to-Block • Block-to-Table • First-In, First-Out • Search, Status
Matrix	• Logical AND, OR, Exclusive OR • Compare and Complement
Bit Operations Program Optimization	• Bit Modify, Bit Sense, and Bit Rotate • Skip • Constant Scan • Subroutine
Communication	• MSTR (984-145 only) • Checksum (MSTR on the 984-145)
Segment Scheduler	• Up to 32 segments

Memory

Battery backed	Lithium battery for 1 year
Non-volatile (loads on power-up)	EEPROM memory card option
Time-of-Day Clock	± 8.0 sec/day 0-60°C

Environmental

Temperature, Operating	0-60°C
Humidity, Operating	0-95% non-condensing
Temperature, Storage	– 40 - + 85°C
Humidity, Storage	0-95% non-condensing
Altitude	15,000 feet (4500 m)
Shock	30 G's, 11 msec, 3 pulses/ axis
Vibration	10-57 Hz: 0.075 mmDA 57-150 Hz: 1 g

Dimensions	142 mm H x 213 mm W x 127 mm D 5.6 in. H x 8.4 in. W x 5 in. D
Agency Approval	VDE, UL, CSA

Power Requirements

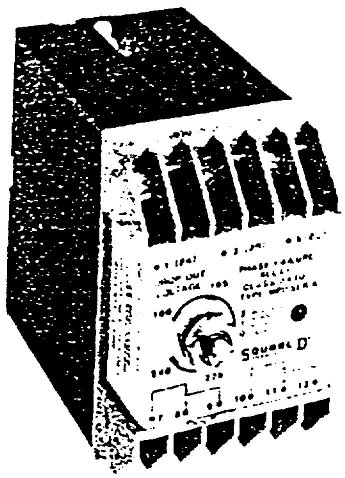
Integral Power Supply	
Input	20-30 VDC @ 1A Full Load
Output	5 VDC @ 3A to the I/O Bus
P120 Power Supply Module	
Input	95-270 VAC, 47/63 Hz
Output	24 VDC @ 1A

Communications

Modbus		Modbus Plus	
Speed:	19,200 Bits per second	Speed:	1 Megabit per second
Mode:	Master-Slave: RTU or ASCII	Mode:	Peer-to-peer
Nodes:	247 (Media dependent)	Nodes:	32 (64 with Repeater)
Media:	Twisted Pair or Telephone	Media:	Twisted Pair (Belden 9841)
		Distance:	1500 feet (6000 feet with Repeaters)

SQUARE D

CLASS 8430, TYPE MPD PHASE FAILURE RELAY



GENERAL

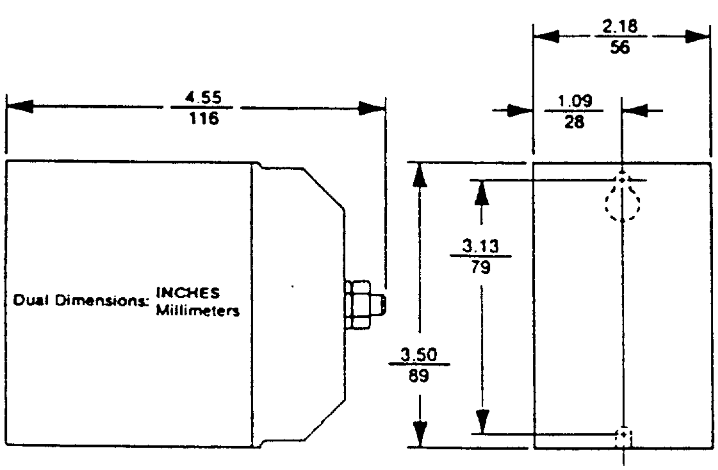
The Class 8430 Type MPD Phase Failure relay is a three phase voltage sensing device that will trip on phase loss, phase reversal, voltage unbalance or undervoltage. Voltage unbalance trips the device when any voltage drops 10% below the average. Undervoltage is externally adjustable from 75% to 100% of the rated voltage. The light emitting diode (LED) will light when the device is energized.

The Type MPD is available in 120V, 240V, 480V and 600V versions and has two 600 volt Form C output contacts standard on all devices.

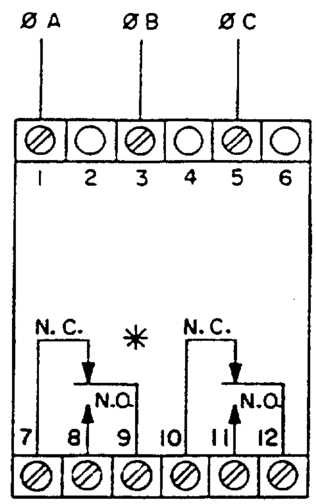
MOUNTING RECOMMENDATIONS

For surface mounting, use two 8-32 screws, 3-1/8 inches apart. Mount adjacent devices on 2-1/4 inch centers. Class 8501 Type X mounting track may be used.

Approximate Dimensions:



Terminal Connections:



* Position of output contacts when relay is de-energized.

Terminals:

Terminals will accept one #18 — #14 AWG copper wire and should be tigntened to 7-9 lb-in of torque. Use wire with 75° C or higher insulation.

OPERATING CHARACTERISTICS

> **WARNING:** HAZARDOUS VOLTAGE CAN SHOCK OR BURN. TURN OFF ALL POWER SUPPLYING THIS EQUIPMENT BEFORE WORKING ON IT.

Operation:

Upon application of the proper 3 phase voltage the Type MPD relay will energize and the LED will turn ON. The LED will turn OFF and the relay will de-energize and remain dropped out as long as any of the following incorrect conditions exist:

1. Phase loss: Loss of phase A, B or C.
   Note: Motor back EMF may supply sufficient voltage to prevent dropout.
2. Phase reversal: Phase rotation other than A-B-C.
3. Voltage unbalance: Any of the 3 line voltages is more than 10% below the average of the 3 line voltages.
4. Undervoltage: Average of the 3 voltages is less than the set level.

Relay will automatically re-energize and the LED will turn ON when the incorrect voltage condition is rectified.

> **WARNING:** PHASE FAILURE RELAY HAS AUTO RESET. DO NOT USE A MAINTAINED CONTACT DEVICE TO CONTROL MOTOR STARTER IF UNEXPECTED RESTARTING OF MOTOR COULD BE HAZARDOUS.

OPERATING CHARACTERISTICS (Cont.)

Undervoltage Adjustment: 120V: from 90 to 120 volts
240V: from 180 to 240 volts
480V: from 360 to 480 volts
600V: from 460 to 600 volts

Pick Up Time: Typically 1/10 sec. when correct three phase voltage is applied.

Drop Out Time: Typically 3 sec. for any incorrect voltage condition.

APPLICATION DATA

Input Voltage: 120, 240, 480, 600 VAC — 60 Hz 3 Phase

Input Burden: 120V — 5.0VA Max.
240V — 5.5VA Max.
480V — 6.5VA Max.
600V — 7.0VA Max.

Contact Ratings:

Contacts	Control Circuit Voltage	AC Ratings			
		Inductive		Resistive	Thermal Continuous Amperes
		Make VA	Break VA	Make & Break Amperes	
DPDT	600	3600	360	2.5	5
	480	3600	360	2.5	5
	240	3600	360	5	5
	120	3400	340	5	5

Transient Protection: 5000 Volts for 50 microseconds.

LED: Turns ON when correct voltage is applied.

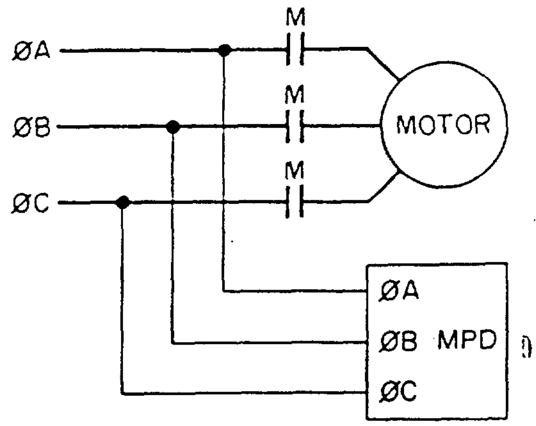
Temperature Rating:

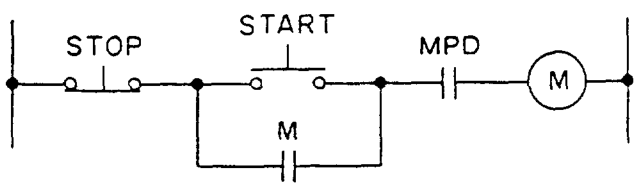
	Temperature Celsius	
	Minimum	Maximum
Operating Ambient Air*	-5	50
Storage	-20	70

*The temperature of the medium (air) in the immediate vicinity of the device into which the heat of the device is dissipated.

CONNECTION DIAGRAMS

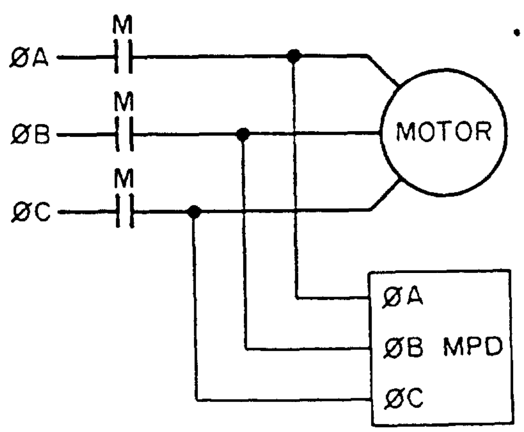
Line Side Monitoring: (Does not protect against high resistance contacts on the contactor.)

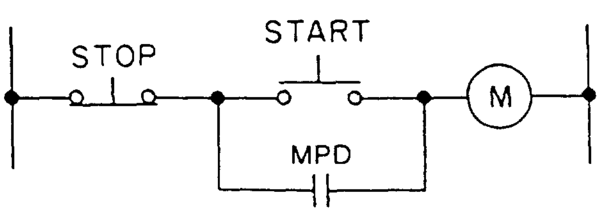




Load Side Monitoring:

WARNING: ALL FUNCTIONS OF THE PHASE FAILURE RELAY ARE BYPASSED WHILE THE START BUTTON IS DEPRESSED. DO NOT USE LOAD SIDE MONITORING IF UNEXPECTED MOTOR REVERSAL COULD BE HAZARDOUS.





ITT Aerospace Controls Division

P.O. Box 3789 Chatsworth, CA 91313-3789
21411 Prairie Street, Chatsworth, CA 91311-5888
(818) 998-8611

INSTALLATION AND OPERATING INSTRUCTIONS
SERIES 180P ADJUSTABLE VACUUM SWITCH
ENCLOSURE 3 (NEMA TYPE 3 AND 4)

NOT SUITABLE FOR USE IN COMBUSTIBLE OR FLAMMABLE ATMOSPHERES

NOTICE

1. For industrial use only, not a consumer product.
2. This item should be installed, operated, and maintained by technical personnel knowledgeable in local and national electrical and mechanical codes.
3. Always use wrench flats provided.
4. Avoid excessive torque on any threaded connection.
5. When surface mounting is used, insure surface is flat.

WARNING: Before proceeding, read and understand the following:

1. Hazardous electrical power may cause severe personal injury, death, or fire.
   a. Do not make electrical connections while electrical power is on.
   b. Do not remove access cover while electrical power is on. Check for multiple circuits.
   c. Provide adequate electrical grounding.
   d. Do not remove insulator.
   e. Reseat insulator before restoring power.
   f. Replace access cover before electrical power is turned on.
2. Operation of this pressure switch may generate a spark, an explosion causing severe injury, death or property damage may result. Do not use this item in a flammable or combustible atmosphere.
3. Excessive pressure may rupture the pressure switch: severe injury, death, or property damage may result. Do not subject this item to pressures in excess of nameplate listed proof pressure.

A. Mounting (See Warning 4):

1. Units may be mounted in any position.
   a. On a flat surface using mounting holes provided and 1/4" screws at least 3/4" long. Cover must be removed for access to mounting holes.
   NOTE: Provision must be made to space the unit approximately 1/8" from the intended mounting surface; or a cut-out must be provided to clear the pressure port; or the unit must be mounted to overhang the edge of the mounting surface.
   b. Port mounted directly to pressure connection. See "Pressure Connection".

B. Pressure Connection (See Warning 3):

1. Units are supplied with female NPT ports suitable for connection to NPT pipe nipples or NPT taper threaded pipe.
   a. Side port marked "LO" is to be connected to the vacuum source.
   b. Pipe joint sealing compound is preferred over teflon tape. However, either method of sealing is acceptable with proper care to avoid introducing sealing material into pressure switch or plumbing.

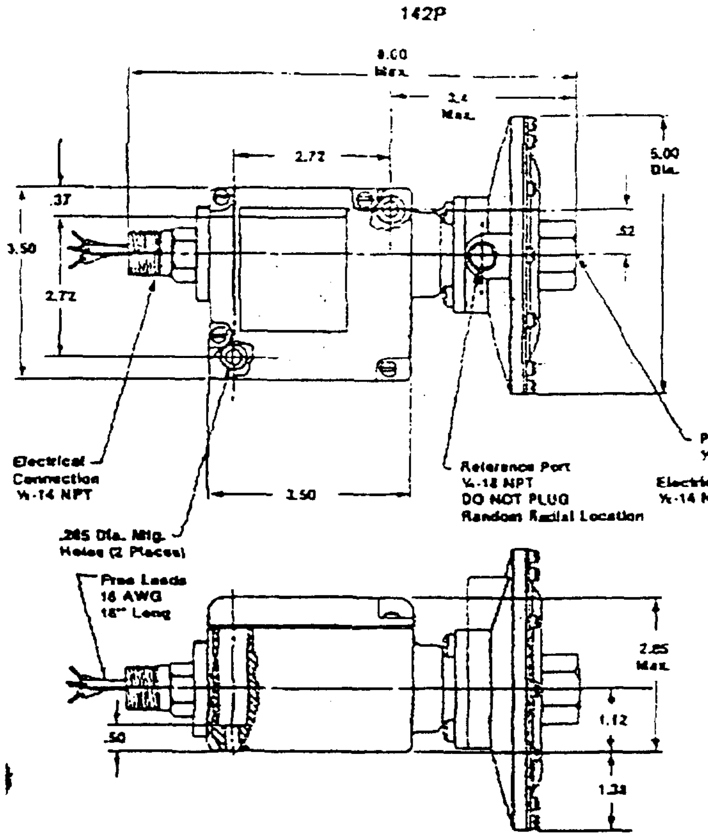
C. Electrical Connections (See Warnings 1 and 2):

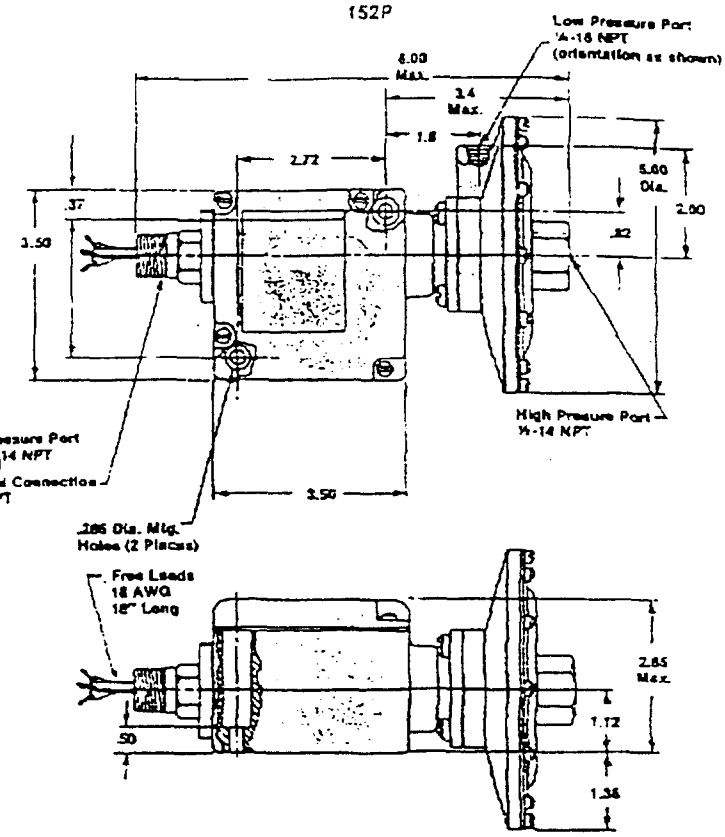
1. Entry for electrical conductors is provided by a ½-14 NPT female conduit connection. Connections are made to a barrier strip located within the unit.
   a. Disconnect electrical power. Check for multiple circuits.
   b. Remove access cover and lift insulator (do not remove insulator).
   c. Make electrical connections in accordance with "National Electrical Code" (NEC) and local code instructions.
   NOTE: Circuitry coding is provided within unit for proper electrical connection.
   d. Grounding: Proper grounding must be accomplished by use of green ground screw provided.
   e. Reseat insulator then replace access cover (and gasket).
   f. Conduit connection: A conduit stop is provided in the hub. Install conduit. Conduit drainage provisions should be provided.

D. Adjustment (See Warnings 1 and 2):

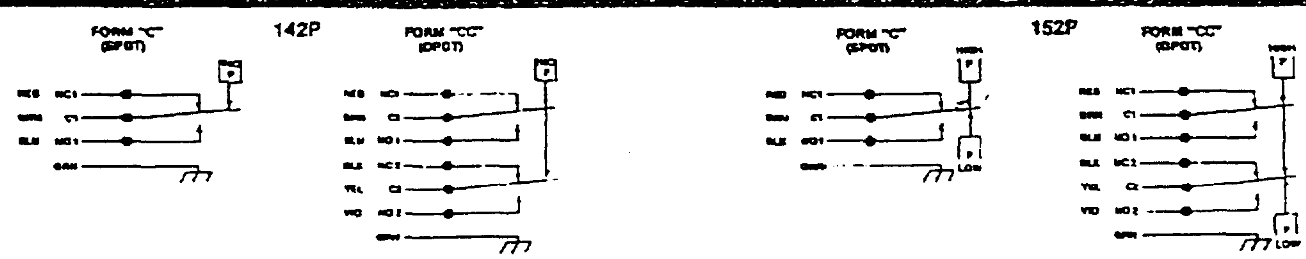
1. Vacuum settings are internally adjustable.
   a. Disconnect electrical power. Check for multiple ciruits.
   b. Remove access cover. Using an open-end wrench on the hex portion of the brass adjustment sleeve, rotate;
      1. Clockwise to increase settings.
      2. Counterclockwise to decrease settings.
      NOTE: When range scale is provided, read increasing set point at bottom of adjustment mechanism.
   c. Replace access cover and gasket.
   d. Return power to unit.

Envelope Dimensions

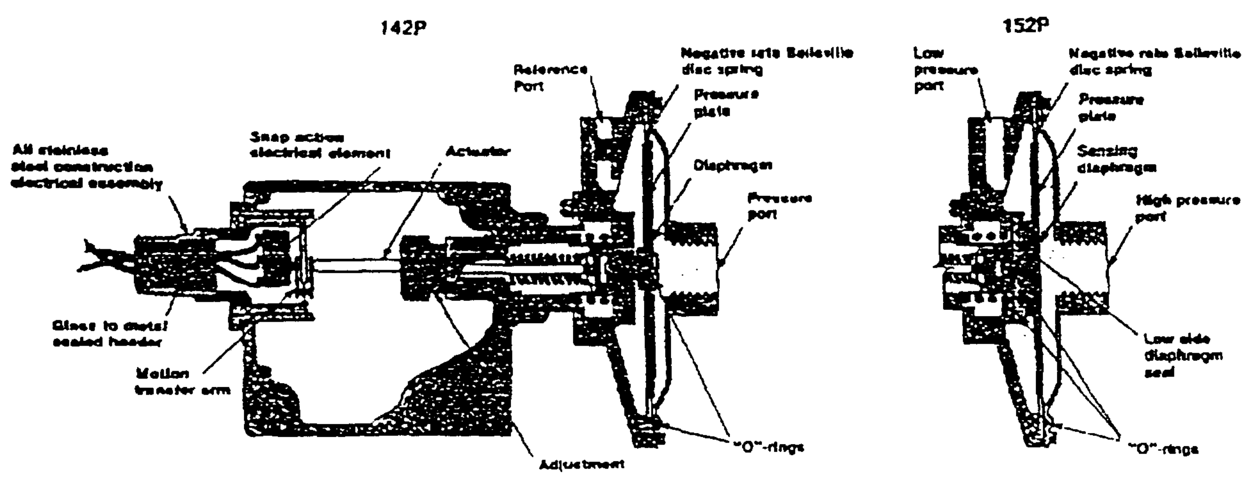




Electrical Form



Basic Principles of Design



Explosion Proof Hermetically Sealed (NEMA 7 and 9)

DESCRIPTION

Compact, adjustable temperature switch featuring the negative rate Belleville disc spring for set point stability and vibration resistance. Available with all stainless steel exterior and interior construction together with a hermetically sealed, explosion proof electrical assembly. Ideally suited for applications involving hazardous and corrosive medias or environments. Series 132T, direct mount or Series 132TC with capillary for remote mount up to 25 feet.

Operating Temperature Data

SERIES 132T/DIRECT MOUNT

Adjustable Range	Adjustable Set Point Range: On Increasing Temperature °F	Adjustable Set Point Range: On Decreasing Temperature °F	Deadband† (approx.) Bottom/Top of Range °F	Proof Temperature °F
B	− 50 to + 30	− 69 to + 26	19/4	250
D	+ 30 to + 125	+ 7 to + 121	23/4	300
F	+ 95 to + 200	+ 70 to + 198	25/4	400
H	+ 115 to + 230	+ 89 to + 224	26/6	400
J	+ 175 to + 300	+ 146 to + 294	28/6	500
L	+ 260 to + 360	+ 236 to + 356	24/4	500
N	+ 290 to + 395	+ 263 to + 391	27/4	500

SERIES 132TC/REMOTE MOUNT

Adjustable Range	Adjustable Set Point Range: On Increasing Temperature °F	Adjustable Set Point Range: On Decreasing Temperature °F	Deadband† (approx.) Bottom/Top of Range °F	Proof Temperature °F
B	− 50 to + 30	− 69 to + 26	19/4	250
D	+ 30 to + 125	+ 7 to + 121	23/4	300
F	+ 95 to + 200	+ 70 to + 196	25/4	400
H	+ 115 to + 230	+ 89 to + 224	26/6	400
J	+ 175 to + 300	+ 146 to + 294	29/6	500
L	+ 260 to + 360	+ 236 to + 356	24/4	500
N	+ 290 to + 395	+ 263 to + 391	27/4	500
P	+ 365 to + 480	+ 338 to + 478	27/4	600
R	+ 485 to + 655	+ 445 to + 646	40/9	750

Standard Specifications

Electrical
Snap action electrical switch listed by Underwriters' Laboratories, Inc. and CSA Testing Laboratories

Electrical Connection
½" — 14 NPT male conduit connection with PVC insulated 18 AWG leads 18" long

Process Connection
½" — 14 NPT male
132T — Direct mount.
132TC Remote mount. Stainless steel 6' capillary with armor jacket, 10" minimum bendable tubing and ½" adjustable gland nut. Optional capillary lengths available.

System Pressure
1500 psig maximum

Proof Pressure
2250 psig

Adjustment
Internal, slotted adjustment nut with range scale

Temperature Range
Ambient: −40°F to +180°F, −40°C to +82°C

Shipping Weight
132T — Approximately 2.5 pounds
132TC — Approximately 3.5 pounds

Ordering Sequence — Select desired option for each category

TO: RUSS CUNNINGHAM 1 of 2

FM: Roy G SW Controls, Inc.

Options

Wetted Materials:
4 300 series stainless steel port and probe assembly, teflon seal (132T)
5 300 series stainless steel, graphite filled non-asbestos packing (132TC)

Adjustable Range
B − 69°F dec. to + 30°F inc.
D + 7°F dec. to + 125°F inc.
F + 70°F dec. to + 200°F inc.
H + 89°F dec. to + 230°F inc.
J + 146°F dec. to + 300°F inc.
L + 236°F dec. to + 360°F inc.
N + 263°F dec. to + 395°F inc.
P + 338°F dec. to + 480°F inc. (132TC only)
R + 445°F dec. to + 655°F inc. (132TC only)

Model # 132T4JC6

$253 ea 10 working Days Add $125 for Expedite FEE.

Electrical Form
C 11 amps and ¼ hp 125 or 250 VAC; 5 amps resistive, 3 amps inductive 28 VDC, .5 amps resistive 125 VDC
CC 11 amps and ¼ hp 125 or 250 VAC; 5 amps resistive, 3 amps inductive 28 VDC, .5 amps resistive 125 VDC

Enclosure
6 Explosion proof • factory sealed • hermetically sealed electrical assembly P/N 057-0030 (C Form); P/N 057-0057 (CC Form). **Underwriters Laboratories, Inc.** listed (file #E56677) or **Canadian Standards Association** certified (file #34146) for Division 1 and 2; Class I, Groups A, B, C and D; Class II, Groups E, F and G hazardous locations (NEMA 7 and 9)

Miscellaneous
A Epoxy paint exterior — extra protection for severe environments
H Stainless Steel Body
I ¾" Conduit box with terminal strip
J Annealed stainless steel port screws for H_2S environments
M Gold electrical contacts for extremely low current applications
N CENELEC approval
R 72" Electrical free leads

Optional Capillary Lengths: (132TC only)
10', 15', 20' and 25' lengths available (insert appropriate number at end of model number—see example)

Special (Consult representative or factory)
- Thermowells
- Non-catalog adjustable range and/or set point and deadband

Ordering Procedure

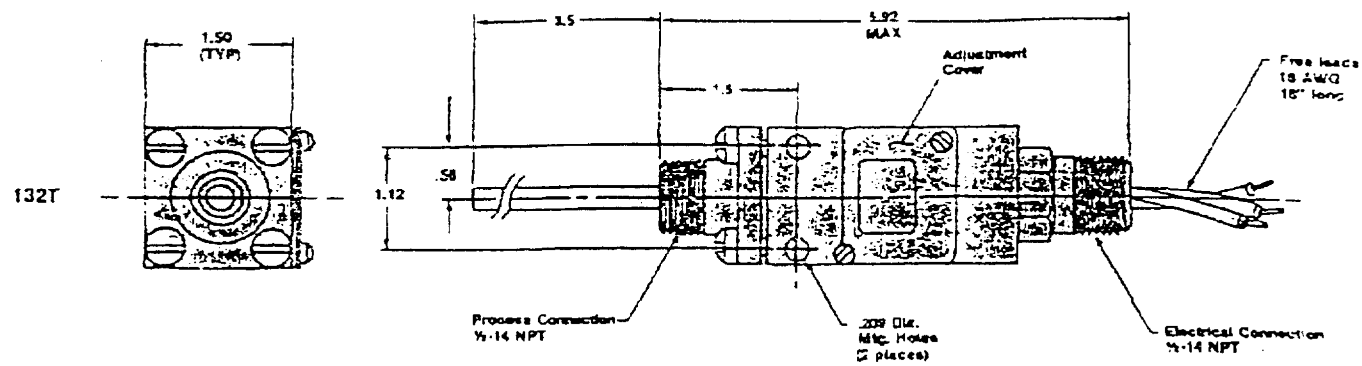
- When factory presetting is desired, specify set point, increasing or decreasing.
- Insert available 'Option' letter designation as required.

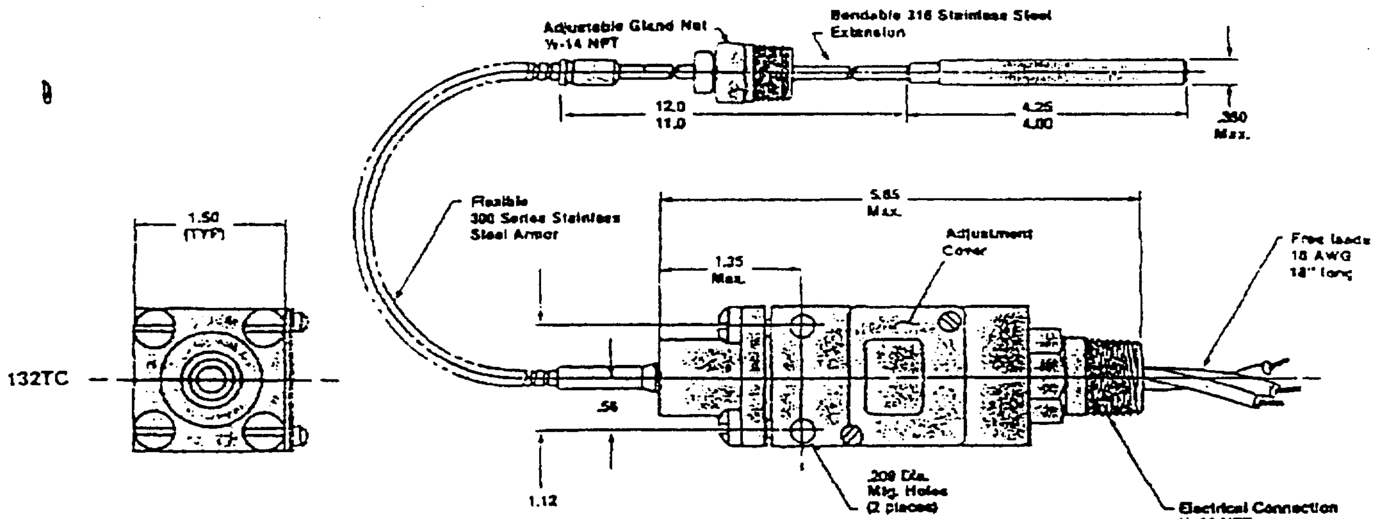
Example

132TC5BCC6__ __
- Series
- Wetted Material
- Adjustable Range
- Electrical Form (specify)
- Enclosure
- Options
- Optional Capillary Length (Series 132TC)

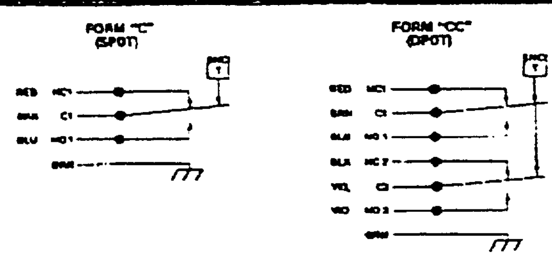
1-843-2374

Envelope Dimensions

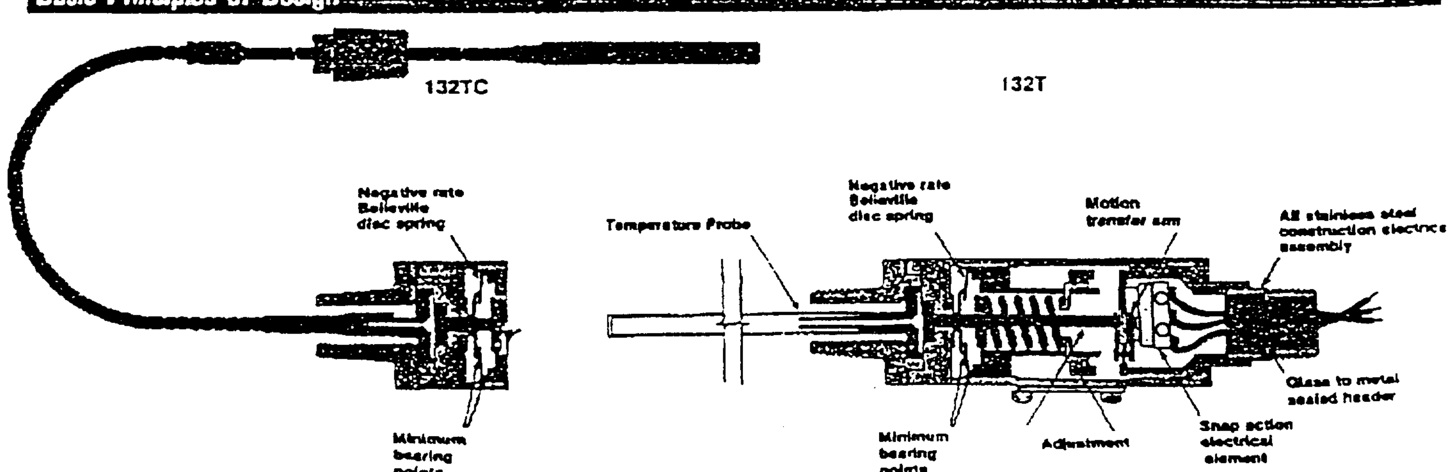




Electrical Form



Basic Principles of Design



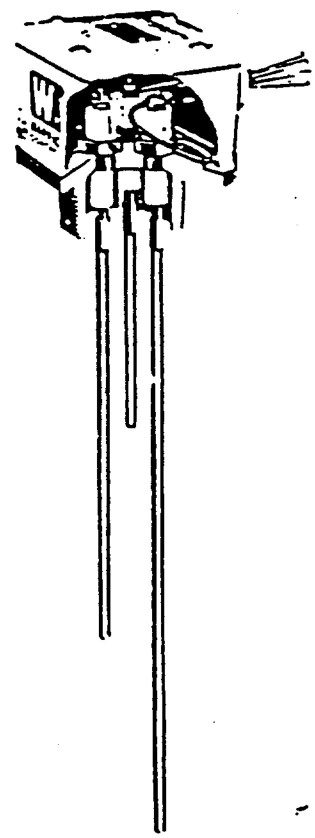
Fittings.

General-purpose single probe fittings.

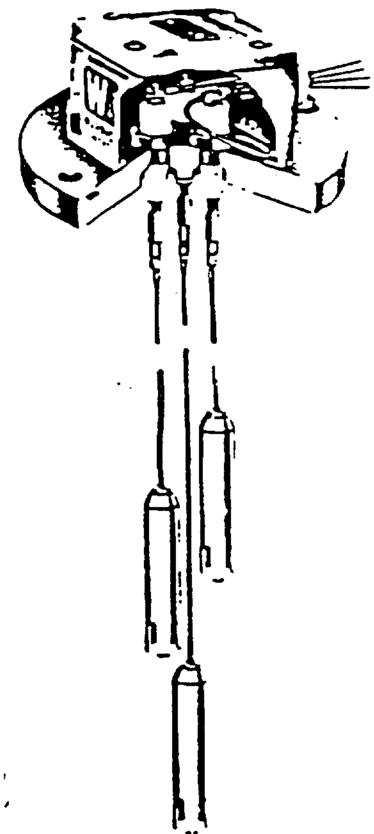
Series 3A. Series 3A electrode fittings are small, inexpensive, pressure-tight threaded assemblies for use in water, caustics and some weak acids at modest temperatures and relatively high pressures.

Series 3B. These electrode fittings are small, inexpensive, pressure-tight assemblies which accommodate a single electrode and are suitable for use in water, caustics and acids at relatively high temperatures.

Series 3H. Series 3H electrode fittings are similar to Series 3A and 3B fittings, above. However, instead of a coupling to receive the electrode, the core is extended to also function as the electrode. Their one-piece design simplifies OEM installation and reduces installation time.



Series 3E Fitting
With Series 3R Electrodes

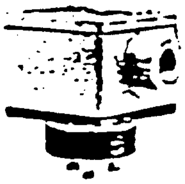


Series 3F Fitting
With 3Z1B Adapters,
3Z1A Suspension Wire
And Series 3W Electrodes

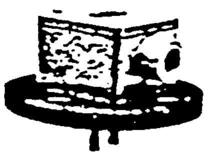
Table 20-1 General-Purpose Single Probe Fittings

Series	Body Material	Insulation Sleeve	Pressure/ Temp.	Listing	Electrodes	Thread Size	Ordering Information (Page)
3AX	303 SS	Nylon	100 psig @ 150 °F 2000 psig @ 75 °F	UL Rec. CSA	¼" rod 3R Series Wire-suspended 3W Series	⅜-18 NPT ⅜-18 NF ⅜-24 NEF	29
3BXX	303 SS 316 SS	Teflon	250 psig @ 406 °F (Sat. steam)	UL Rec. CSA FM	¼" rod 3R Series Wire-suspended 3W Series	⅜-18 NPT ⅜-18 NF ⅜-24 NEF	29
3HXXX	303 SS	Nylon	2000 psig @ 75 °F	UL Rec. CSA FM	None. Core is extended to proper length	⅜-18 NPT ⅜-18 NF ⅜-24 NEF	30
		Teflon	250 psig @ 406 °F (Sat. steam)				

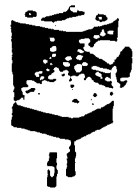
General-purpose multi-probe fittings.



Series 3E. The electrode fittings in Series 3E are general-purpose, cast metal, pressure-tight assemblies sized to accommodate from one to seven electrodes and equipped with external pipe threads for attachment to the vessel.



Series 3F. Series 3F electrode fittings are general purpose, flanged, pressure-tight assemblies sized to accommodate from one to seven electrodes. They mate with standard pipe flanges coupled to the top of the vessel.



Series 3N. Series 3N fittings are inexpensive, general-purpose assemblies which accommodate one to three electrodes and mount on a flat surface on the top of open tanks or closed vessels operating at atmospheric pressure. Various body materials qualify them for use on water and diluted corrosive liquids.

Table 21-1 General Purpose Multiple Probe Fittings

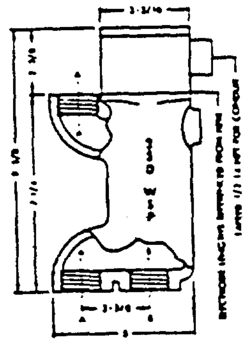
Series	Type of Connection	Probes/ Electrodes	Terminal Housing	Wetted Material	Pressure/ Temperature	Listing	Ordering Information (Page)
3EXX	Threaded	1 thru 7 C.I.—383A R.B —383A SS—3818	Die-cast Aluminum, Epoxy coated	Cast iron Red brass 316 SS	125 psig 353°F 250 psig 406°F 250 psig 406°F	UL Rec CSA FM	29
3FXX	Flanged	1 thru 7 C.I.—383A R.B.—383A 1018—383A 316—3218 PVC—3P017	Die-cast Aluminum, Epoxy coated	Cast iron Red brass 316 SS 1018 C.S. PVC	125 psig 353°F 225 psig 150°F 230 psig 100°F 275 psig 100°F 200 psig 75°F	CSA	29
3NXX	Bracket	1 thru 3 PVC—3P017 R.B —3P017 316—3P018	Die-cast Aluminum, Epoxy coated	PVC Red brass 316 SS	0 psig 150°F 0 psig 500°F 0 psig 500°F	CSA	30

Chart 21-1 Dimensions

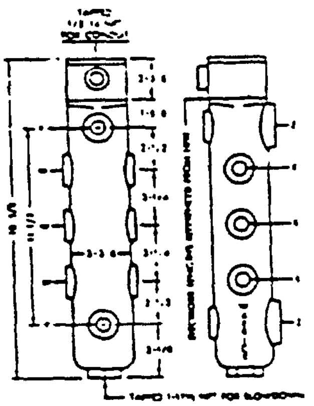
	Attachment To Vessel					
	3E	3F		3N		
No. of Probes	NPT	Nominal Pipe Flange Size	Diameter of Flange		Conduit Boss Thread Size Series 3E, 3F and 3N	Terminal Housing Size Series 3E, 3F and 3N W x D x H
1	1-11½	1	4¼	2¼" square flat pad 1⅛" dia hole in top of vessel secured w/#10 machine screws at the corners of a 1⅝" square	¾-14	2¼ x 2¼ x 2¼
2	2-11½	2	6		¾-14	3¼ x 3¼ x 2¼
3	2-11½	2	6		¾-14	3¼ x 3¼ x 2¼
4	2½-8	2½	7	Not available with 4-7 probes	¾-14	3¼ x 3¼ x 2¼
5	3-8	3	7½		¾-14	4 x 4 x 2½
6	3-8	3	7½		¾-14	4 x 4 x 2½
7	3-8	3	7½		¾-14	4 x 4 x 2½

Specialty Fittings.

Side chamber fittings.



Series 3C. These electrode fittings are cast iron, pressure-tight chambers containing one to four electrodes and are provided with pipe tappings for connection to the side of boilers, hydropneumatic tanks and pressure vessels so the level in the chamber duplicates the level in the vessel.



Series 3K. Electrode fittings in this series are cast iron, pressure-tight chambers containing one to four electrodes and are provided with pipe tappings for connection to the side of boilers, steam generators and pressure vessels so the level in the chamber duplicates the level in the vessel. Additional tappings accommodate tricocks and gauge glass fittings.

Table 22-1 Side Chamber Fittings

Series	No. of Elec-trodes	Body Material	Pressure/ Temp.	Electrode Length	Listing	Ordering Information (Page)
3CXXX	1 thru 4 Probe 3H3BX	Cast iron Red brass	250 psig 406°F (Sat. steam)	½ inch to 6 inches	UL Rec. CSA FM	29
3KXXXX	1 thru 4 Probe 3H3BX	Cast iron	250 psig 406°F (Sat. steam)	1½ inch to 13 inches	UL Rec. CSA FM	30

Sanitary fittings. (Food Industry)

Series 3M. Series 3M electrode fittings are two-piece assemblies, complete with one to four electrodes, intended for use in dairy, drug and pharmaceutical and food and drink applications where cleanliness is paramount. Design permits rapid removal of the fitting from the vessel for cleaning and sterilization.

Table 22-2 Sanitary Fittings and Electrodes (Food Industry)

Series	No. of Elec-trodes	Body Contour	Body Material	Probe Material	Listing	Pressure/ Temp.	Ordering Information (Page)
3MXXX	1 thru 4	45° bevel tri-clamp quick clamp	Type 66 Nylon	316 SS	FDA-approved materials CSA	150 psig 1[illegible]0°F	30

Multiple wire-suspended fittings.

Series 3U. Inexpensive Condulet-style assemblies designed for use with wire-suspended electrodes can be mounted on end of conduit over open sumps, open tanks, ponds and reservoirs. Available in PVC or cast iron body, ½", ¾" or 1" conduit connections, 1-10 electrodes depending on conduit connection.

Table 22-3 Multiple Wire-Suspended Electrode Fittings

Series	No. of Elec-trodes	Body Material	Conduit Size	Pressure/ Temp.	Literature	Ordering Information (Page)
3UXX	1 thru 10	PVC Cast iron	½, ¾, 1	0 psig 150°F	853630	31

Corrosion-resistant multi-probe fittings.

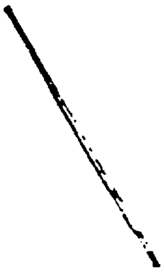
Series 3G. Designed for use in corrosive applications. Flanged assemblies sized to accommodate from one to seven electrodes and to mate with standard flanges on vessel top. Plate mounting is also available. PVC bases with polycarbonate housings (¾" NPT PVC conduit hub).

Table 22-4 Corrosion-Resistant Multi-Probe Fittings

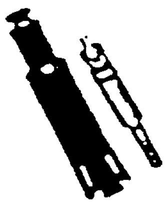
Series	Mounting Style	No. of Elec-trodes	Electrodes Style	Base Material	Housing Material	Literature	Ordering Information (Page)
3GXXX	Flanged Bracket (Plate)	1 thru 4 (2" flg) 1 thru 7 (3" flg) 1 thru 7 (3", 6" plate)	3R— Electrode Rod 3W-3Y— Wire-Suspended 3T— Tapered Rod	PVC	Poly Car-bonate	853500–853580	30

Electrodes.

General application electrodes.



Series 3R. These electrodes are metallic rods with one end threaded so they can be screwed into the couplings on electrode fittings to extend vertically down into the liquid. They are available in a variety of materials to satisfy the requirements of water and many corrosive solutions. Series 3T, tapered electrode, used in conjunction with fitting 3G.



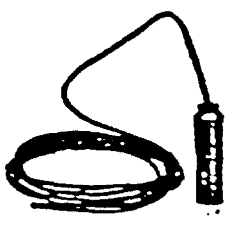
Series 3W. Series 3W electrodes are metallic bars contained within a protective plastic shield. They are suspended above the liquid by the use of PVC-insulated wires. 7/8" dia. x 3 3/4" in length.

Table 23-1 General Application Electrodes

Series	Style	Material	Sheathing	Ordering Information (Page)
3RXXXX 3TXXXX	5/8" rod (threaded) 3/8" rod (tapered)	Brass 303 SS 316 SS Carp 20 Hast. B Hast. C Monel Titanium	PVC (200°F) Teflon (500°F) Slip-on/ Heat Shrink	31
3WX*	Wire Suspended	Brass 303 SS	Polyethylene Shield PVC-coated wire (150°F)	31

*To attach 3W to 3E, 3F or 3H fittings, 321A wire and a 321B adapter kit are required. One adapter required for each electrode

Corrosion-resistant electrode.



Series 3Y. Corrosion-resistant metallic bars within a protective plastic shield designed for use in corrosive liquid applications. Suspension wire is PVC-jacketed and is attached to the electrode at the factory. 7/8" dia. x 3 1/2" in length.

Table 23-2 Corrosion-Resistant Electrode

Series	Style	Tip Material	Shield Material	Ordering Information (Page)
3YXXX	Wire Suspended	Carp 20 Hast B Hast C 316 SS	PVC (150°F)	31

Chart 23-3 Sensitivity-Material Selectio

Liquid Or Material	Sensitivity-Conductivity: Ohms/cm	Sensitivity-Conductivity: Micro-Mhos/cm	Electrode Mater: Good*	Electrode Mater: Better
†Acids	Consult Factory		Consult Factory	
Aluminum Hydroxide	2.2K	450	316 SS	Titan
Aluminum Sulfate	2.2K	450	303 SS	Hast. C
Ammonia	5K	200	316 SS	N.A.
Ammonium Chloride	1K	1K	316 SS	Titan
Ammonium Hydroxide	10K	100	316 SS	Titan
Ammonium Nitrate	18K	50	303 SS	316 SS
Ammonium Sulfate	10K	100	316 SS	Titan
Baby Foods	1K	1K	303 SS	316 S
Barium Chloride	1K	1K	Carp. 20	N.A.
Barium Nitrate	1K	1K	316 SS	N.A.
Beer	2.2K	450	303 SS	316 S
Black Liquor	1K	1K	Consult Factory	
Borax—Aqueous	10K	100	Brass	303 S
Bourbon	200K	5	N.A.	316 S
Brine	1K	1K	N.A.	Hast. C
Buttermilk	1K	1K	N.A.	316 S
Cadmium Chloride	1K	1K	316 SS	N.A.
Cadmium Nitrate	1K	1K	316 SS	N.A.
Cake Batter	5K	200	303 SS	316 S
Calcium Chloride	1K	1K	Carp. 20	Hast
Calcium Hydroxide	10K	100	316 SS	Titan
Catsup	2.2K	450	303 SS	316 S
Caustic Soda	1K	1K	316 SS	Hast
Cement Slurry	5K	200	303 SS	316 S
Coffee	2.2K	450	303 SS	316 S
Corn Syrup	45K	21	303 SS	316 S
Corn—Cream Style	2.2K	450	303 SS	316 S
Ferric Chloride	10K	100	N.A.	Titan
Ferrous Sulfate	10K	100	Carp. 20	Titan
Ink (Water Base)	2.2K	450	N.A.	316 S
Jams/Jellies	45K	21	303 SS	316 S
Juices—Fruit/Vegetable	1K	1K	303 SS	316 S
Lithium Chloride	1K	1K	N.A.	Carp.
Magnesium Chloride	1K	1K	316 SS	Carp
Magnesium Hydroxide	2.2K	450	316 SS	N.A.
Mayonnaise	5K	200	303 SS	316 S
Mercuric Chloride	90K	11	N.A.	Titan
Milk	1K	1K	303 SS	316 S
Molasses	10K	100	303 SS	316 S
Mustard	1K	1K	303 SS	316 S
Oil—Soluble	10K	100	N.A.	303 S
Paper Stock	5K	200	Titan.	N.A.
Photographic Solutions	1K	1K	316 SS	Hast
Plating Solutions	2.2K	450	N.A.	316
Potassium Chloride	1K	1K	316 SS	Tita
Salts—Chemical	2.2K	450	Monel	N.A.
Sewage	5K	200	303 SS	316
Silver Nitrate	1K	1K	316 SS	Carp
Soap Foam	18K	50	303 SS	316
Sodium Carbonate	2.2K	450	316 SS	Mon
Sodium Hydroxide	1K	1K	316 SS	Hast
Soups	1K	1K	303 SS	316
Starch Solutions	5K	200	303 SS	316
Sugar Solutions	90K	11	303 SS	316
Vinegar—Aqueous	2.2K	450	316 SS	Carp
Water—Carbonated	3K	330	303 SS	316
Water—Condensate	18K	50	Brass	303
Water—Chlorinated	5K	200	316 SS	Mon
Water—Distilled	450K	2	Brass	303
Water—Deionized	2.0M	.5	Brass	303
Water—Hard/Natural	5K	200	Brass	303
Water—Salt	2.2K	450	Monel	N.A.
Wine	2.2K	450	303 SS	31
Zinc Chloride	1K	1K	Carp 20	Titan
Zinc Sulfate	2.2K	450	316 SS	Titan

*Less than .020" erosion per year

**Less than .002" erosion per year

†Note: Liquid concentration and temperature will affect conductivity and material erosion rate. Contact factory for detailed information.

N.A.—No material available with this erosion rate

Optional Character Chart for Dual Function Controls (continued from page 28)

	Reset Function	Normally Closed Pushbutton	Power Outage Feature	Retrofit Plate
D	X			
G	X	X	X	
J	X	X	X	X
K	X		X	
L	X		X	X
R				X
S	X	X		
T	X	X		X
W	X			X

Series 3A Single Electrode Fittings

ORDER BY COMPONENT NUMBER—— 3 AX

3RD PLACE SYMBOL	Thread
1	3/8-18NPT
2	5/8-18NF
3	5/8-24NEF

Terminal Covers
3Z2A—Black Neoprene
B5036—Red Silicone

Series 3B Single Electrode Fittings

ORDER BY COMPONENT NUMBER—— 3 BXX

3RD PLACE SYMBOL	Thread
1	3/8-18NPT
2	5/8-18NF
3	5/8-24NEF

4TH PLACE SYMBOL	Metal Parts
A	303 SS
B	316 SS

Series 3C Electrode Fittings

ORDER BY COMPONENT NUMBER—— 3 CXXX

3RD PLACE SYMBOL	Number of Electrodes
1	One
2	Two
3	Three
4	Four

4TH PLACE SYMBOL	Chamber Material
A	Cast Iron
B	Red Brass

5TH PLACE SYMBOL
Specify Length of Electrodes

Series 3E Electrode Fittings

ORDER BY COMPONENT NUMBER—— 3 EXX*

3RD PLACE SYMBOL	Number of Electrodes
1	One
2	Two
3	Three
4	Four
5	Five
6	Six
7	Seven

4TH PLACE SYMBOL	Body Material
A	Cast Iron
B	Red Brass
C	316 SS

*Use suffix [illegible] to indicate terminal housing rubber gaskets and stainless steel screws

Series 3F Electrode Fittings

ORDER BY COMPONENT NUMBER—— 3 FXX*

3RD PLACE SYMBOL	Number of Electrodes
1	One
2	Two
3	Three
4	Four
5	Five
6	Six
7	Seven

4TH PLACE SYMBOL	Flange Material
A	Cast Iron
B	Red Brass
C	316 SS
D	101BCS
E	PVC

*Use suffix 56 to indicate terminal housing rubber gaskets and stainless steel screws

Series 3G Electrode Fittings

ORDER BY COMPONENT NUMBER— 3GXXX

3RD PLACE SYMBOL

	Number of Electrodes
1	One
2	Two
3	Three
4	Four
5	Five
6	Six
7	Seven

4TH PLACE SYMBOL

	Base Size and Style
A	2" Pipe Flange
B	3" Pipe Flange
C	3"x6" Plate

5TH PLACE SYMBOL

	Electrode Type
1	316 SS Inserts for Use with ¼" Rod Electrodes
2	Tapered Electrode Assembly
3	Wire-Suspended Electrodes

Series 3H Electrode Fittings

ORDER BY COMPONENT NUMBER— 3HXXX*

3RD PLACE SYMBOL

	Thread
1	1/8-18NPT
2	5/8-18NF
3	3/8-24NEF

4TH PLACE SYMBOL

	Sleeve*
A	Nylon 3/4" Lg.
B	Teflon 3/4" Lg.

*Longer Teflon Sleeves Available

5TH PLACE SYMBOL

	Length (Feet)
1	One
2	Two
3	Three

*Specify Exact Electrode Length

Series 3K Electrode Fittings

ORDER BY COMPONENT NUMBER— 3KXXXX

3RD PLACE SYMBOL

	Number of Electrodes
1	One
2	Two
3	Three
4	Four

4TH PLACE SYMBOL

	Size & Location Of Tricock Tappings	
	NPT	*Location
A	None	None
B	1/2-14	Left
C	3/4-14	Left
D	1/2-14	Right
E	3/4-14	Right

*Viewer facing gauge glass

5TH PLACE SYMBOL

	NPT Size Of Gauge & Equalizer Tappings	
	Gauge	Equalizer
1	None	1-1½
2	None	1¼-1½
3	1/2-14	1-1½
4	1/2-14	1¼-1½
5	3/4-14	1-1½
6	3/4-14	1¼-1½

6TH PLACE SYMBOL

Specify Length of Electrodes

Series 3M Electrode Fittings

ORDER BY COMPONENT NUMBER— 3MXXX

3RD PLACE SYMBOL

	Number of Electrodes
1	One
2	Two
3	Three
4	Four

4TH PLACE SYMBOL

	Electrode Lengths (Feet)
A	One
B	Two
C	Three

5TH PLACE SYMBOL

	Body Contour (2" Size)
1	45° Bevel
2	Tri-Clamp
3	Quick-Clamp

Series 3N Electrode Fittings

ORDER BY COMPONENT NUMBER— 3NXX*

3RD PLACE SYMBOL

	Number Of Electrodes
1	One
2	Two
3	Three

4TH PLACE SYMBOL

	Body Material
A	PVC
B	Red Brass
C	316 SS

*Use [illegible] housing rubber gaskets and [illegible]

Series 3U Electrode Fittings

ORDER BY COMPONENT NUMBER — 3UXX

3RD PLACE SYMBOL	Conduit Size and No. of Electrodes
1	½". 1-5
2	¾". 1-7
3	1". 1-10

4TH PLACE SYMBOL	Body Material
A	PVC
B	Cast Iron

Series 3W Electrodes

ORDER BY COMPONENT NUMBER — 3WX

Component Number 3Z1A—Suspension Wire

Component Number 3Z1B—Adapter Kit

3RD PLACE SYMBOL	Electrode Material
1	Brass
2	303 SS

Series 3R or 3T Electrodes

ORDER BY COMPONENT NUMBER — 3RXXXX or 3TXXXX

3RD PLACE SYMBOL	Length (Feet)
1	One
2	Two
3	Three
4	Four
5	Five
6	Six
	et cetera

4TH PLACE SYMBOL	Electrode Material
A	Brass
B	303 SS
C	316 SS
D	Carp 20
E	Hast B
F	Hast C
G	Monel
H	Titanium

5TH PLACE SYMBOL	Sheathing Slip-On
0	None
1	PVC
2	Teflon
	Sheathing Heat Shrink
4	PVC
5	Teflon

Use only when tips are required

6TH PLACE SYMBOL	Electrode Tip
A	303 SS
B	316 SS

• Specify exact length of electrode

Series 3Y Electrodes

ORDER BY COMPONENT NUMBER — 3YXXX

3RD PLACE SYMBOL	Shield Material
1	PVC

4TH PLACE SYMBOL	Electrode Tip Material
C	316 SS
D	Carp. 20
E	Hast. B
F	Hast. C

5TH PLACE SYMBOL	Length of Wire
1	10 feet
2	20 feet
3	30 feet
	et cetera

Component Number 3Z1B—Adapter Kit

Limited Warranty and Remedy

Warrick Controls, Inc. warrants to the original user that those products supplied by it and used in the service and in the manner for which they are intended shall be free from defects in materials and workmanship for a period of one (1) year after installation, or fifteen (15) months from date of shipment. Except as may be expressly provided for in a written agreement between WARRICK and the user, WARRICK DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY AND ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

The sole and exclusive remedy with respect to the above limited warranty or with respect to any other claim relating to defects or any other condition or use of the products supplied by Warrick, however caused, and whether such claim is based upon warranty, contract, negligence, strict liability or any other theory, is limited to the repair or replacement of the part or product, excluding any labor or any other cost to remove or install said part or product or, at Warrick's option, to repayment of the purchase price. Notice of any such claim must be given, in writing, to Warrick Controls, Inc., Royal Oak, Michigan 48073, within fifteen months after the first installation or use of the products. In no event shall Warrick be liable for special, direct, indirect or consequential damages, including, but not limited to, loss of use or profits or to interruption of business activity.

FORM 173A

RECOMMENDED ELECTRODE FITTING GROUNDING METHODS

GENERAL:

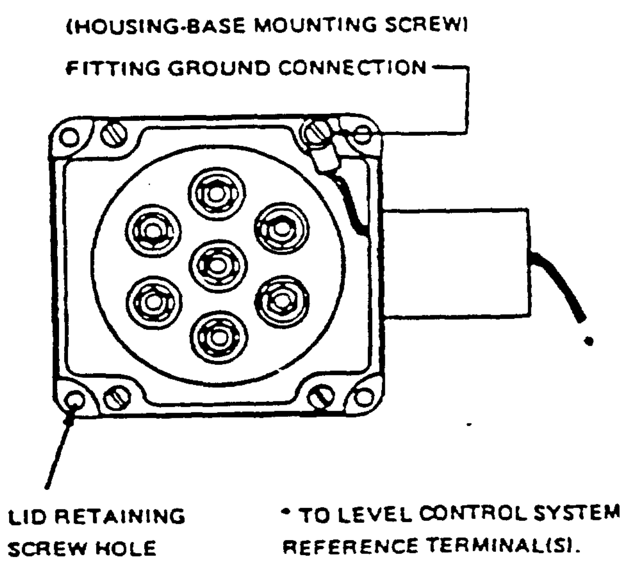
1) Always follow good N.E.C. (C.E.C.) grounding and bonding wiring procedures.
2) Use 'approved' insulated ring terminals for all wiring connections.
3) Use # 14 or # 16 AWG, type MTW or THHN copper wire only.
4) Wiring must be rated higher than nominal voltage and temperature values anticipated in installation.

INSTALLATION:

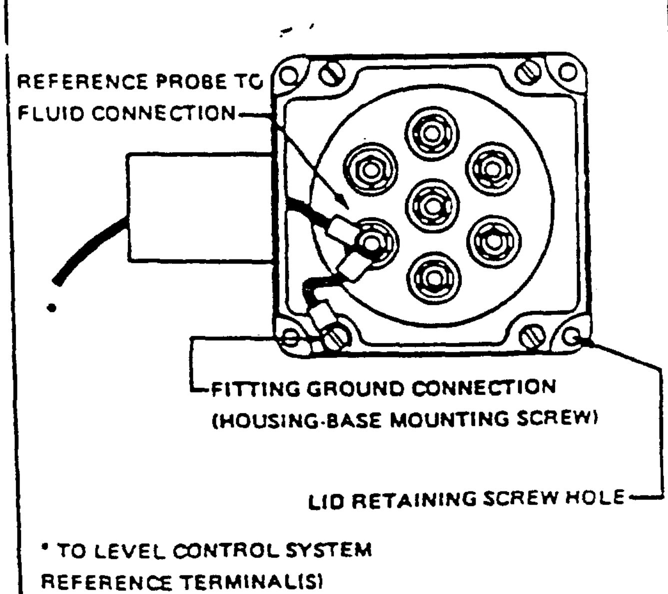
1) During installation orient the fitting so the tapped hub on the terminal housing faces the most favorable direction for receiving the conduit from the control box.

2) After conduit has been installed and conductors pulled through same, fasten the incoming ground conductor(s) as shown below; the ground connection should be facilitated by securing that end of the system ground wire to one of the four screws provided which hold the terminal housing to the body of the electrode fitting.

FOR METALLIC VESSEL



FOR NON-METALLIC VESSEL



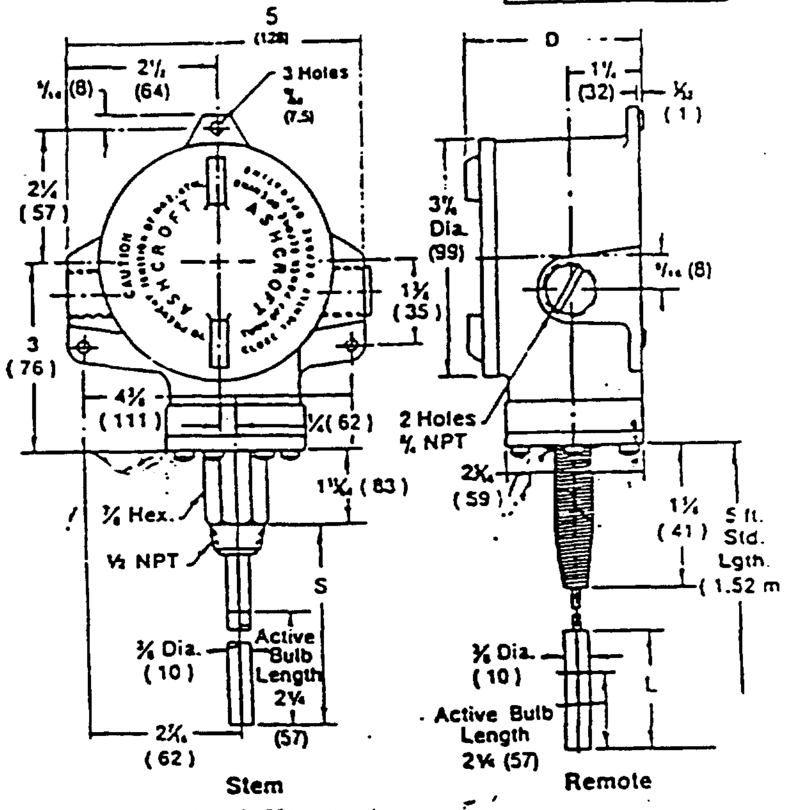
*FOR ADDITIONAL INFORMATION, SEE RESPECTIVE LEVEL CONTROLS INSTALLATION INSTRUCTIONS.

WARRICK CONTROLS, INC., 4237 NORMANDY COURT, ROYAL OAK, MI 48073 - PH. 313-545-2512

INSTALLATION & MAINTENANCE SNAP ACTION SWITCHES FOR TEMEPRATURE CONTROL

Series T700

TYPE	"D" DIA.
SPDT	3 (76)
2-SPDT	3⅞ (99)



*Copper available in 3" length only.

without disturbing the process. Standard well materials include brass, steel, and stainless steel; other materials are available on application. Selection should be based on corrosion resistance requirements and process pressure.

MOUNTING

A. STEM MOUNTED CONTROLS

These controls have a 1/2" NPT threaded adapter and may be attached directly (or indirectly by means of a thermo-well) to equipment to be controlled. WHEN INSTALLING OR REMOVING CONTROL ALWAYS USE THE WRENCH FLATS OR HEX ABOVE THE THREADS. DO NOT TWIST THE HOUSING.

B. REMOTE MOUNTED CONTROLS

Two types of union bushings are available to install a remote-mounted control bulb into a thermowell or other ½" NPT threaded hole. A non-pressure-tight type consists of a bushing, split grommet and compression nut. To use this, the bulb is inserted through the nut and the split grommet is slipped onto the capillary between the compression nut and the bushing. After positioning the bulb as desired, tighten the compression nut to the bushing. This will lock the capillary at the desired location. The pressure-tight type is clamped to the bulb after insertion by tightening a compression nut. To use this, the union bushing is screwed into the ½" NPT threaded hole. The compression nut and sleeve are slipped onto the bulb which is then inserted into the union bushing. Bulb is then positioned and compression nut is hand tightened plus 2¼ turns. This will lock the capil-

numbers in ( ) are millimeters

ELECTRICAL CONNECTIONS
'emove cover
400 Series — two screws hold cover to enclosure
700 Series — cover unscrews

NDUIT CONNECTIONS

NOTE — It is recommended that Teflon tape or other sealant be used on conduit, bushing or plug threads to ensure integrity of the enclosure.

T400 series standard — one ¾" NPT conduit hole right side.

T700 series standard — two ¾" NPT conduit holes with one permanent plug. NEMA 7 & 9 enclosures require proper conduit seals and breathers as per the National Electrical Code.

T400 & T700 series — XJL variation — two ¾" NPT conduit holes with two ¾" to ½" NPT reducing bushings.

T400 series — XJK variation — two ¾" NPT conduit holes.

T400 SERIES

SPDT — Wire directly to the switch according to circuit requirements. On controls with pilot lights wire lights according to circuit diagram on inside of cover. See special wiring instruction tag for single switches with two pilot lights and dual switches with one or more lights.

2-SPDT — Dual switching elements consist of two SPDT switches mounted together in a bracket. Switches are calibrated to have simultaneous operation within 1% of range either on increasing or decreasing pressure but not in both directions. Wire directly to the front and rear switch according to circuit requirements. Leads are provided on rear switch color coded as follows:

Common	— White
Normally Closed	— Red
Normally Open	— Blue

See SPDT instructions for pilot light hook-up.

When hermetically sealed switch elements (s) are supplied, the lead color coding is as follows:

Common	— White
Normally Closed	— Red
Normally Open	— Blue

T700 SERIES

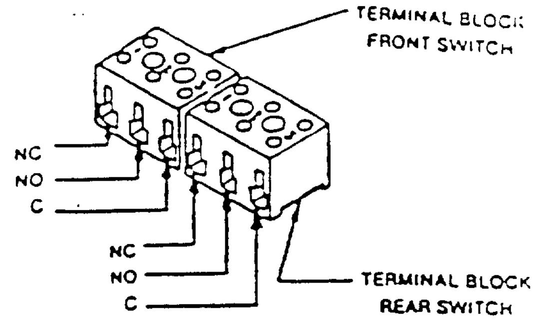
SPDT — Wire directly to the switch according to circuit requirements.

2-SPDT — Wire to front switch terminal block (left) and rear switch terminal block (right) as marked. Strip insulation ⁵⁄₁₆", insert in proper terminal connector and tighten clamping screw to secure.

ADJUSTMENT OF SET POINT

T400 & T700 Series — A single set point adjusting nut (¼") is located centrally at the bottom on the inside of the enclosures.

The bulb of the control should be immersed in a bath at the desired set point temperature. Optimum performance will be obtained if bulb is fully immersed. Allow five minutes for initial stabilization. T400 & T700 Series controls



have a single set point adjusting nut located centrally at the bottom on the inside of the enclosure. As received, the temperature switch will normally be set to approximately 90% of the indicated range.

Set point adjustment will be facilitated by the use of a low voltage test lamp hooked across the common (C) and normally open (NO) terminals. Under this condition the light will be "OFF" until set point is reached.

After stabilization, turn the adjustment nut so that light is "off" and then reverse rotation until light comes "on". Control enclosure should be lightly tapped after adjustment nut is rotated, to settle internal adjusting component stresses. This assures minimum temperature differential. Bath temperature should then be cycled to insure that set point is correct.

After installation of the control replace cover to insure electrical safety and to protect internal parts from the environment.

T450 and T750 VARIABLE DEADBAND SWITCHES

Deadband is varied by rotating the wheel on the precision switch. When viewed from the front of the enclosure, rotation to the left increases deadband—rotation to the right decreases deadband. Letters on the wheel may be used as a reference. Deadbands obtainable may be varied up to approximately 8% of temperature range.

ADJUSTMENT OF SET POINT

As received, the temperature switch will normally be set to approximately 90% of range. Rotate the wheel on the MICRO SWITCH all the way to the right; this will provide smallest deadband. Increase bath temperature to the required set point and turn the adjustment nut until the switch changes mode. Lower the bath temperature to reset the switch. Rotate the wheel on the MICRO SWITCH until the desired deadband is obtained. The upper set point will be changing upward with this adjustment. Lower the bath temperature to reset the switch. Then increase the bath temperature to the desired set point and turn the adjusting nut until the switch changes mode. Lower the bath temperature and check reset point and deadband.

T428 & T428 MANUAL RESET SWITCHES

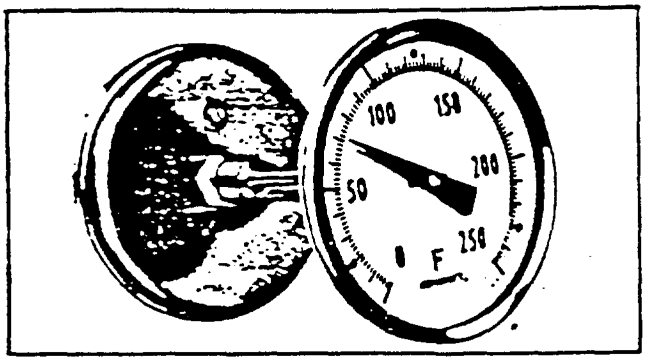
Dress wire leads from switch terminals so as not to interfere with or touch reset button.

NOTE—As indicated above, adjustment of set point is made by use of ¼" nut. Precision switch element mounting screws and bracket adjusting screw are factory sealed and should not be tampered with.

DRESSER INDUSTRIES

INSTRUMENT DIVISION
DRESSER INDUSTRIES INC
STRATFORD, CONNECTICUT 06497

Ashcroft® Bi-Metal Thermometers Series EI



Standard Specifications

- Hermetically Sealed
- External Adjustment
- Maxivision Dial
- 1% full span accuracy
- All welded stainless steel construction
- Silicone on the coil provides vibration dampening and superior time response
- Heavy duty glass standard; plastic or shatterproof glass optional

How to Order................Code 30 EI 60 R 040 0/250°F

1. Case Size: 3" Code 30
2. Style: Code EI
3. Stem Conn: 1/2" NPT Code 60
4. Stem Location: Rear Code R
5. Stem Length: 4" Code 040
6. Range: Code 0/250°F

Case Size			Stem				Stem Lengths Available		Temperature Range					
Dia	Code	Style Code	Connection	Code	Location	Code	"S" Length (inches)	Code	°F Fahrenheit	°/div.	fig. inter.	°C Celsius	°/div.	fig. inter.
2"	20	EI	Plain	40	Rear	R			†† −80/120°	2	20	−50/50°	1	10
			Pointed Plain	50	Rear	R	2½	025	†† −20/120°			−20/120°	2	20
			¼ NPT	60	Rear	R	4	040	††30/130°	1	10	††0/50°	1	5
3"	30		½ NPT Union	42	Everyangle	E	6	060	0/200°	2	20	0/100°	1	10
			½ NPT	60			9	090	0/250°		50	10/150°	2	20
			½ NPT	60	Rear	R	12	120	50/300°			0/200°		
					Lower	L	15	150	50/400°	5		0/300°	5	50
5"	50		½ NPT Union	42	Everyangle	E	18	180	50/550°			**†50/450°		
			½ NPT	60			24	240	†200/700°			**†100/500°		
			½ NPT	60	Rear	R			†100/800°	10	100			
					Lower	L			**†200/1000°					

** Satisfactory for continuous service up to 800°F or 425°C. Can be used for intermittent service from 800 to 1000°F, or 425 to 500°C.
Use Ashcroft Duratemp thermometers for ranges above and below those listed above.

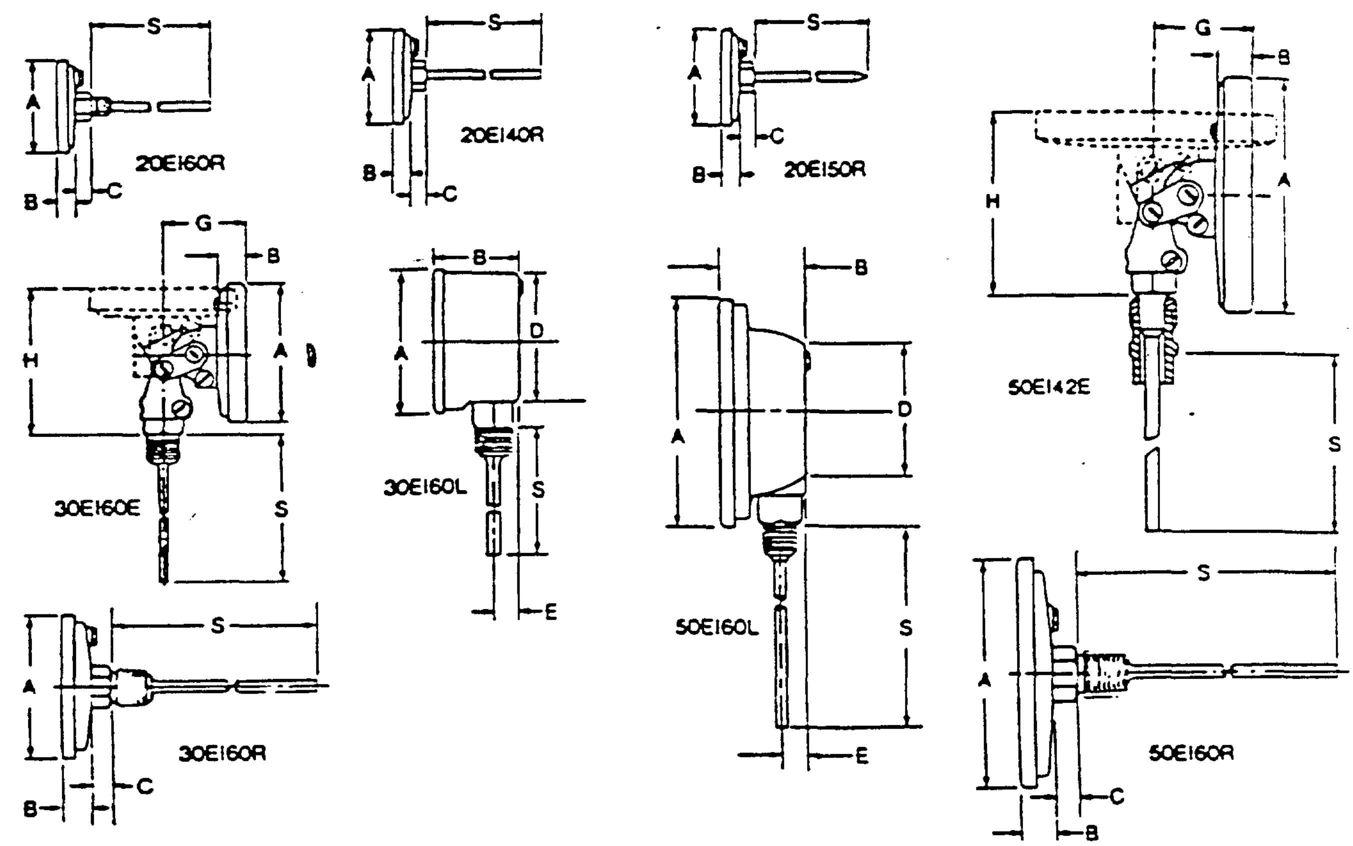
† Minimum stem length for these ranges is 4".

†† Minimum stem length lower connection and Everyangle 4".

Thermowells must be used on all pressure or velocity applications, to protect the stem of the thermometer from corrosion and physical damage, and to facilitate removal of the thermometer without disturbing the process.

Maximum ambient temperature 200°F (95°C)

Overtemperature Limits	
Top of Range °F	Maximum Overtemperature
up to 250	100% of span
250/550	50% of span
550/1000	800°F **



Case Series — EI

Dial Size	Connection Location	A	B	C	D	E	G	H	S	CONN.	HEX	WT** S-2½"
2"	Rear (Plain)	2 3/32 (53)	3/8 (10)	5/16 (8)	—	—	—	—	*	—	11/16	4 1/2 oz.
2"	Rear Plain (Pointed Stem)	2 3/32 (53)	3/8 (10)	5/16 (8)	—	—	—	—	*	—	11/16	4 1/2 oz.
2"	Rear (Threaded)	2 3/32 (53)	3/8 (10)	5/16 (8)	—	—	—	—	*	1/4 NPT	11/16	4 1/2 oz.
3"	Rear	3 5/32 (80)	19/32 (15)	5/16 (8)	—	—	—	—	*	1/2 NPT	7/8	7 oz.
3"	Lower	3 5/32 (80)	1 27/32 (47)	—	—	37/64 (15)	—	—	*	1/2 NPT	7/8	11 oz.
5"	Rear	5 1/32 (128)	23/32 (18)	5/16 (8)	—	—	—	—	*	1/2 NPT	7/8	16 oz.
5"	Lower	5 1/32 (128)	1 15/16 (49)	—	3 (76)	19/32 (15)	—	—	*	1/2 NPT	7/8	26 oz.
5"	Every Angle	5 1/32 (128)	23/32 (18)	—	—	—	1 7/8 (48)	3 9/16 (91)	*	1/2 NPT	7/8	25 oz.
5"	††E/A Liquid Filled	5 1/32 (128)	23/32 (18)	—	—	—	1 7/8 (48)	3 9/16 (91)	*	1/2 NPT	7/8	†28 oz.

Notes
Figures in ( ) are in millimeters. All others inches.
*Standard 'S' dimensions are 2-1/2, 4, 6, 9, 12, 15, 18, & 24 inches
Standard stem diameter is 1/4 inch
**Add 1 oz. for every 2" of stem length

Order Information

Example:

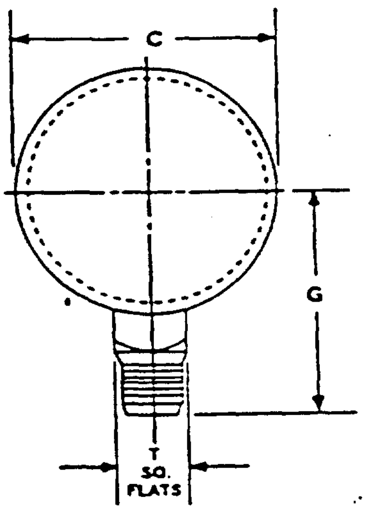
25	W	3000	HL	02L	XGV	3000#

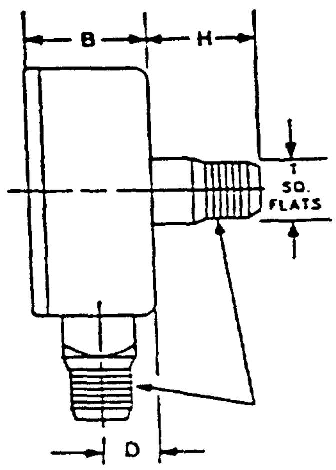
Dial Size		Movement		Material Case/Window		Material Tube/Socket		Connection Size/Location		Common Variations		Standard Ranges
Code		Code		Code		Code		Code		Code		
25	2½"	W	Patented Spring Suspended	3000	Stainless Steel/ Glass	H	Bronze Tube Brass Socket	02L	¼" NPT Lower	XT5	.013" Throttle Plug*	See Range Tables
				3003	ABS/ Acrylic			02B	¼" NPT Back (N/A 3003)	XGV	Silicone Filled Case	
						HL	With Glycerine Filled Case	RWL	SAE J-514 Lower Only			

*Throttle plug is standard on all Liquid Filled gauges.

Dimensions

Gauge Type		B	C	D	G	H	T
3000	inch	1¼	2²³/₃₂	¹³/₃₂	2³/₁₆	⅞	⁹/₁₆
	mm	32	69	10	55	22	14
3003	inch	1¼	2⅞	½	2³/₁₆	N/A	⁹/₁₆
	mm	32	73	13	55	N/A	14





Standard Ranges

RANGE	Single Scale		Dual Scale
	DIAL GRADUATIONS		
psi	Figure Interval	Minor Graduation	kPa Inner
pressure			
0/15	1	0.5	100
0/30	5	0.5	200
0/60	5	1	400
0/100	10	1	700
0/160	20	5	1100
0/200	20	5	1400
0/300	30	5	2000
0/400	50	10	2800
0/600	50	10	4000
0/1000	200	20	7000
0/1500	300	50	10,000
0/2000	400	50	14,000
0/3000	500	100	20,000
0/4000	1000	100	28,000
0/5000	1000	100	34,000
0/6000	1000	200	40,000
vacuum 30-0 Inches Mercury	5 Inches	0.5	-100/0

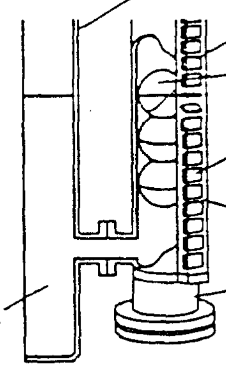
compound	Figure Interval "Hg	Figure Interval psi	Minor Graduation "Hg	Minor Graduation psi	kPa Inner
30" Hg Vac/ 0/15 psi	5	3	1	0.5	-100/100
30" Hg Vac/ 0/30 psi	10	5	1	1	-100/200
30" Hg Vac/ 0/60 psi	10	10	2	1	-100/400
30" Hg Vac/ 0/100 psi	15	10	5	2	-100/700
30" Hg Vac/ 0/160 psi	30	20	5	5	-100/1000
30" Hg Vac/ 0/300 psi	30	25	5	5	-100/2000

GEMS®

Instruction Bulletin
No. 128616

SureSite®
Liquid Level Indicators

Installation and Maintenance



SureSite Operating Principle . . .

As it rises with liquid level, a magnet-equipped float within the SureSite inverts the magnetic flags in the external indicator to "colored-side-out". The flags remain magnetically interlocked in a column, until again inverted to "white-side-out" by the float as liquid level falls. Level is indicated by the junction of the "colored" and "white" portions of the column. Note: **SureSite units are not designed to monitor interface between liquids.**
* Patent No. 4.457.171

IMPORTANT: Read these instructions carefully before installing the SureSite

Pre-Installation Precautions . . .

1. When locating tank ports for the SureSite, make sure that:
   a. No strong magnetic fields or magnets will be in close proximity to the SureSite.
   b. No magnetic materials, railings, protective cages, I-beams, etc., will be closer than 2" (76.2mm) from the SureSite unit.

Failure to observe these precautions will inhibit operation of the unit.

2. Make sure that mating flanges, NPT ports or shut-off valves (if used) on the tank will align properly with SureSite connections. Improper alignment may damage welds and compromise integrity of the SureSite.

3. Mating flanges on the tank must be clean for proper gasket sealing.

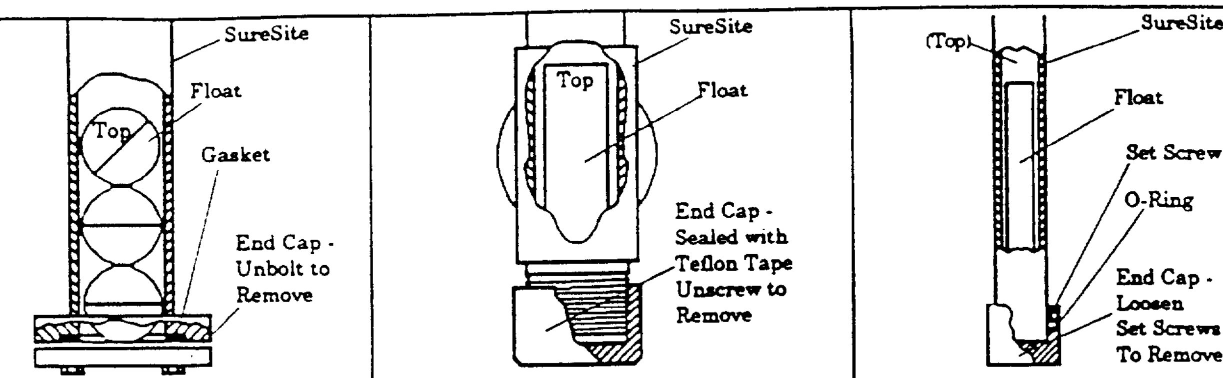
Installation . . . (Caution: Handle the SureSite with care to avoid damaging threads, flange surfaces, etc.)

See "Standard Models" charts for dimensional data and specifications on all units. SureSite Types A, B, C, D and Mini-Types 1 and 2 are supplied with floats packed separately. Types E and F are supplied with floats installed and supported by a cardboard support tube.

1. Remove all packing from SureSite housing.
2. Prepare unit for installation. (Note: When preparing unit, manually move float up and down along flag cage and observe that magnetic flags flip over properly.

<u>SureSite Types A, B, C, D, Mini-1 and Mini-2:</u>
a. Remove end cap (Fig. 1)
b. Insert float assembly in housing. End of float marked "TOP" must be upward when SureSite is installed.
c. Reassemble end cap with gasket (or O-Ring) properly seated and tighten securely. Torque bolted end cap to 70-80 in lbs. Torque setscrews on Mini-1 and Mini-2 to 14-16 in. lbs.

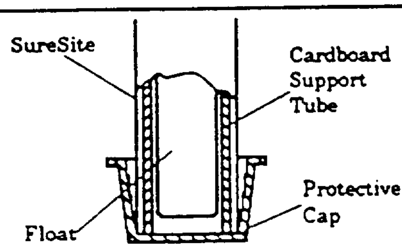
<u>SureSite Type E:</u>
a. Remove protective cap from bottom of unit (Fig. 2) and withdraw cardboard support tube.



Types A, B and C Units | Type D Units | Mini-1 and Mini-2 Units

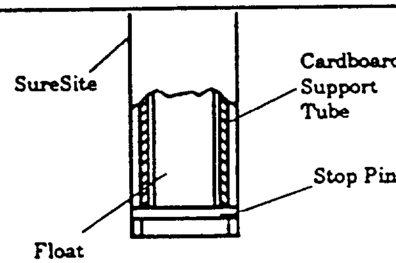
(Note: End of float marked "Top" must be upward when installed.)

Fig. 1.: Float (Packed Separately) Installed in SureSite



Type E Units

- Fig 2 -
Protective Cap and Support Tube to be Removed Before Installation.



Type F Units

- Fig. 3 -
Support Tube to be Removed Before Installation.

Installation (Cont) . .

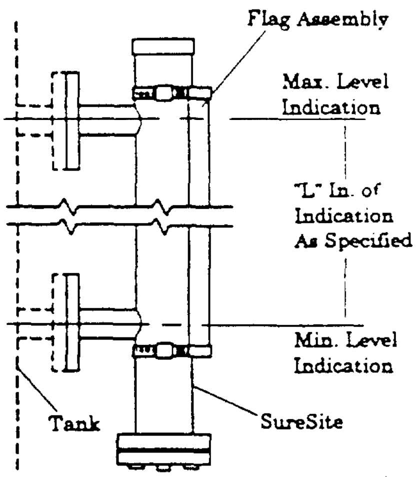
SureSite Type F:
a. Remove stop pin (Fig. 3).
b. Withdraw cardboard support tube.
c. Reinstall Stop Pin.

3. **Install unit vertically on tank (Figs. 4, 5 or 6) with end marked "Top" upward,** using standard procedures. Make sure that mating port flanges or NPT connections are properly aligned with unit. **Do not attempt to force alignment,** as this may damage welds and compromise unit integrity. Tighten connections securely.

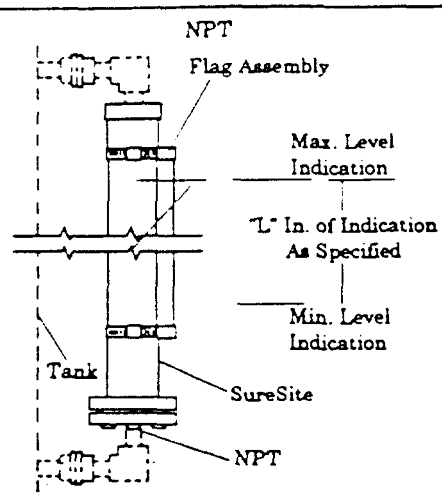
Note: **Gaskets are not supplied for port flanges.**

Before Filling Tank . . .

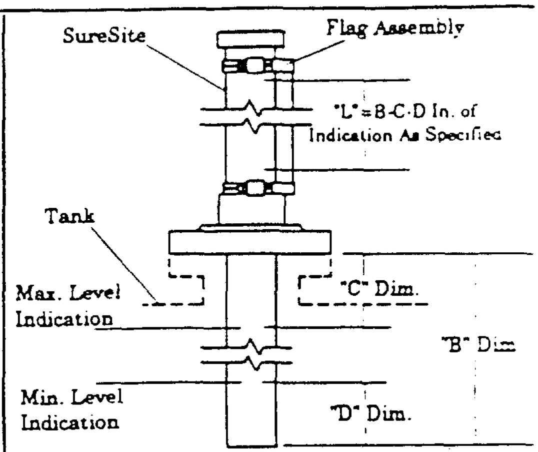
Be sure the installation is free of foreign particles . . . especially any that are magnetic. Check that all connections are secure. A hydrostatic pressure test of the complete assembly is recommended.



- Fig 4-
SureSite Side-Mounted and Side-Connected on Tank.



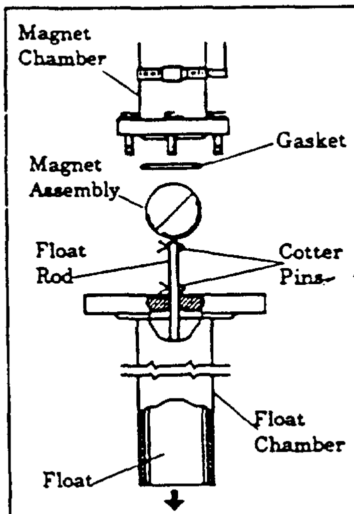
- Fig 5 -
SureSite Side-Mounted and Connected on Tank.



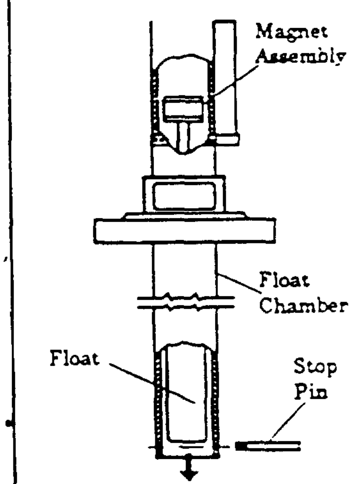
- Fig 6 -
SureSite Top-Mounted on Tank.

Maintenance . . .

For occasional "wipe-down" cleaning, the only maintenance normally required: Remove float assembly from unit and wipe down float and inside of unit housing. (CAUTION: Make sure tank is depressurized and liquid removed before removing float.)



- Fig 7 -
SureSite Type E Float Removal



- Fig 8 -
SureSite Type F Float Removal

<u>SureSite Types Mini-2, B, C and D</u>: It is not necessary to disturb the installation on the tank. Remove end cap (Fig. 1) and withdraw float. When reinstalling float, make sure end marked "TOP" is up. Reassemble end cap with gasket properly seated (Fig. 1) and tighten securely. Torque bolted end cap to 70-80 in lbs. or tighten set screws firmly in place (as applicable).

<u>SureSite Types Mini-1 and A</u>: Disconnect top and bottom NPT connections and remove unit from tank. Remove end cap (Fig. 1) and withdraw float from unit. Reinstall float in unit so that end marked "TOP" will be up when unit is reinstalled on tank. Reassemble end cap with O-Ring or gasket properly seated (Fig. 1) and tighten securely. Torque bolted end cap to 70-80 in lbs. or tighten set screws firmly in place (as applicable). Reinstall unit on tank.

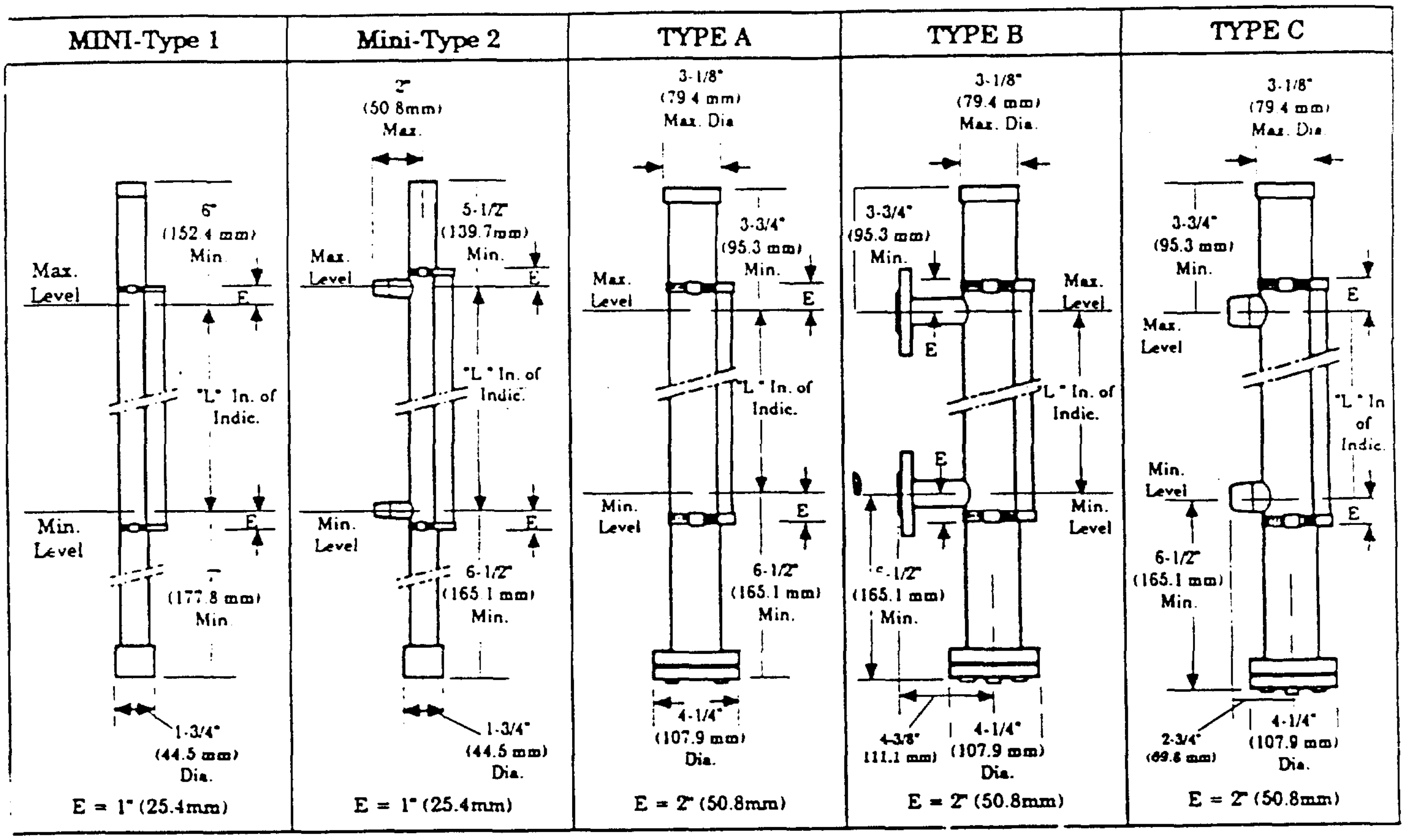
<u>SureSite Type E</u>: To remove float, unbolt and remove unit from tank (Fig 7). Unbolt and remove magnet chamber from float chamber. Remove two cotter pins and magnet assembly from float rod and withdraw float and rod. To reinstall float, insert float with rod up and through top of float chamber, then secure with cotter pin (Fig. 7). Reinstall magnet assembly on float rod with second cotter pin. Assemble gasket and magnet chamber on float chamber. Torque bolts to 70-80 in. lbs. Reinstall SureSite on tank.

<u>SureSite Type F</u>: Unbolt and remove unit from tank. Unscrew and remove stop pin at bottom of unit and withdraw float assembly from unit (Fig. 8). Reassemble float in unit with magnet assembly up and reinstall stop pin. Reinstall unit on tank.

IMPORTANT: Float assembly contains a magnet. Float should be inspected after tank cleaning or flushing and cleaned to remove any metal particles that may have been attracted to it. Especially important on new installations, this should be done during regular maintenance.

To order replacement parts for SureSite units, contact Gems Sensors Division for proper specifications.

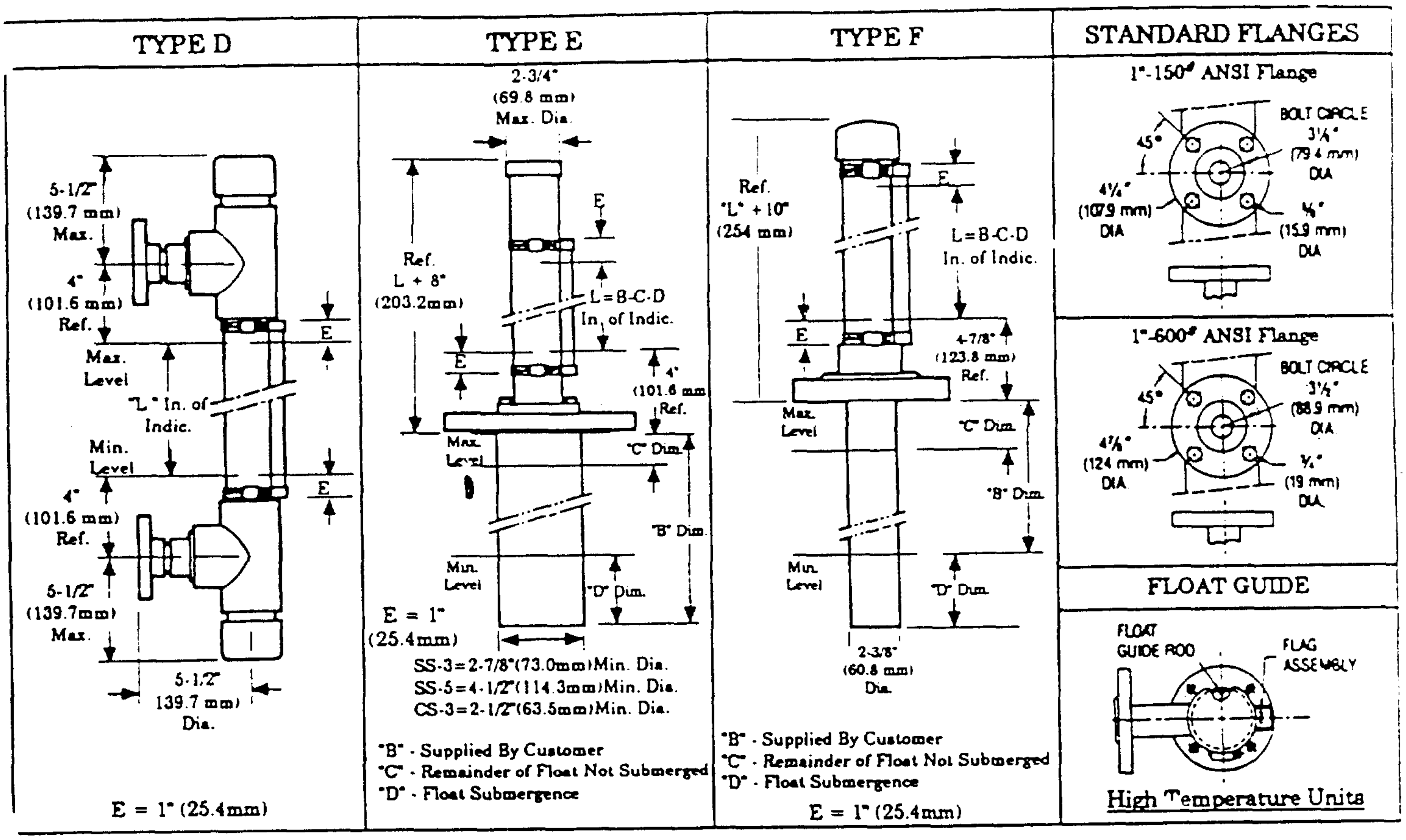
Standard Models Dimensional Data . . .



Specifications . . .

	Design Type	Model Number	Housing Material	Float Material	Flag Mat'l	Max. Pressure	Max. Temperature	Connection	Max. Length of Indication	Max. Overall Unit Length
MINI	1	86210	304 SS	304 SS Buna N	P P	150 PSI 150 PSI	+300°F (+149°C) +180°F* (+82°C)	End 1/2" NPT	240" (6096 mm)	21' (6.4 m)
	2		304 SS	304 SS Buna N	P P	150 PSI 150 PSI	+300°F(+149°C)	Side 1/2" NPT	240" (6096 mm)	21' (6.4 m)
STANDARD	A >	86500 87055 87110	316 SS	316 SS 316 SS 316 SS	P P A	150 PSI 600 PSI 600 PSI	+300°F(+149°C) +300°F(+149°C) +500°F(+260°C)	Top & Bottom 1" NPT (Female)	240" (6096 mm)	21' (6.4 m)
	B	86501	316 SS	316 SS	P	150 PSI	+300°F(+149°C)	Side 1"-150# Flange**	240" (6096 mm)	21' (6.4 m)
		87040 87120		316 SS 316 SS	P A	600 PSI 600 PSI	+300°F(+149°C) +500°F(+260°C)	Side 1"-600# Flange**	240" (6096 mm)	21' (6.4 m)
	B Inverted > >	86503	316 SS	316 SS	P	150 PSI	+300°F(+149°C)	Side 1"-150# Flange**	240" (6096 mm)	21' (6.4 m)
		87140 87125		316 SS 316 SS	P A	600 PSI 600 PSI	+300°F(+149°C) +500°F(+260°C)	Side 1"-600# Flange**	240" (6096 mm)	21' (6.4 m)
	C	86502 87050 87130	316 SS	316 SS 316 SS 316 SS	P P A	150 PSI 600 PSI 600 PSI	+300°F(+149°C) +300°F(+149°C) +500°F(+260°C)	Side 1" NPT (Male)	240" (6096 mm)	21' (6.4 m)
	C Inverted > >	86504 87150 87135	316 SS	316 SS 316 SS 316 SS	P P A	150 PSI 600 PSI 600 PSI	+300°F(+149°C) +300°F(+149°C) +500°F(+260°C)	Side 1" NPT (Male)	240" (6096 mm)	21' (6.4 m)

Standard Models Dimensional Data . . .



Specifications . . .

	Design Type	Model Number		Housing Mat'l.	Float Material	Flag Mat'l.	Max. Pressure	Max. Temperature	Connection	Max. Length of Indication	Max. Overall Unit Length
STANDARD	D	86195		PVC	PVC	P	40 PSI	+140°F(+60°C)	Side 1"-150# Flange	125" (3175.0mm)	12' (3.65m)
	E	86200	SS-3	316 SS	316 SS	P	150 PSI	+300°F(+149°C)	Top 3"-150# SS Flange	60" (1524mm) S.G.: .85 - 1.4	11'5" (3.48m)
			SS-5	316 SS	316 SS*	P	150 PSI	+300°F(+149°C)	Top 5" 150 #. SS Flange	60" (1524mm) S.G.: .7 - 1.4	11'3" (3.43m)
			CS-3	CS 316 SS	Buna N	P	150 PSI	+180°F(+82°C)	Top 3"-150# CS Flange	60" (1524mm) S.G.: .75 - 1.4	11'3" (3.43m)
	F	86205		PVC	PVC	P	40 PSI	+140°F(+60°C)	Top 3"-150# Flange	60" (1524mm) S.G.: 1.0 & Up	11'4" (3.45m)

Key to Specifications . . .

P = Plastic A = Aluminum
* 230°F (110°C) Maximum in Oil.
**Other Flange Sizes Available
> Mounting Bracket - P/N 36406 - **Recommended for Type "A" units only** (Over 10' (3.048m) Length.
> > **Use Inverted units when float removal must come from top of unit.** On inverted models of Type B or C units, "Min" dimensions in "Dimensional Data" (above) must be transposed from end to end of units.

Viscosity Effects: Increased viscosity increases response time.

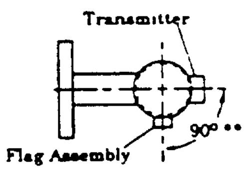
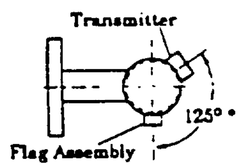
SureSite Accessories . . . Installation

Liquid Level Transmitters, P/N 85875 . . .

Transmitters mount along with flag assemblies on specific SureSite models, as in Fig. 9, and are operated by the SureSite float. Units connect to all GEMS receivers or, when signal-conditioned, connect directly to User's instrumentation.

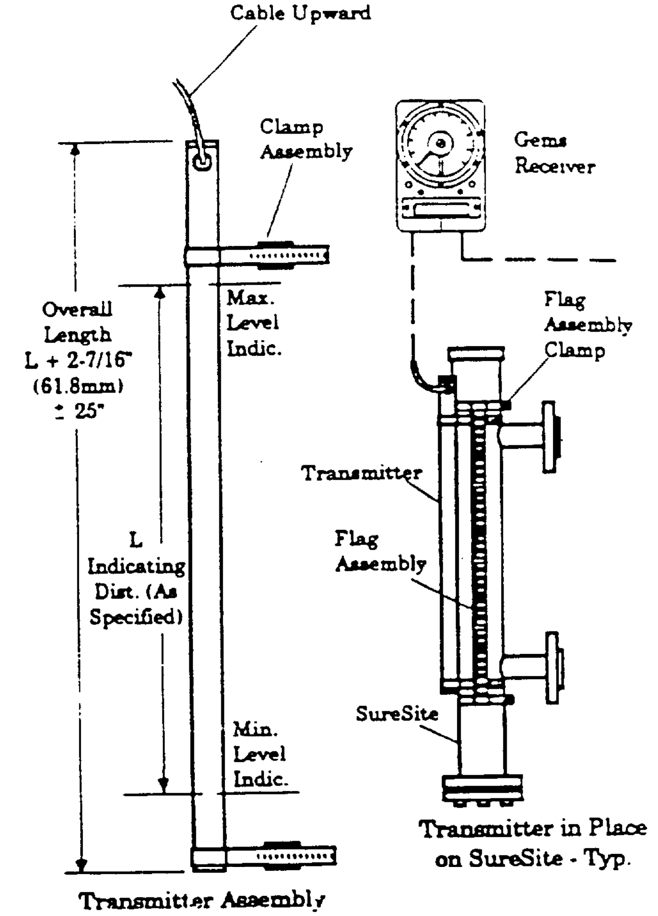
Specifications . . .

Housing Material	Polysulfone
Transmitter Resolution	1/2" (12.7mm) Max.
Accuracy	Within ± 1/2" (12.7mm)
Oper. Temperature	+225° F(+109° C) Max.
Cable	#22 awg. 18"L

Top View	SureSite Type	P/N
	A	86500
	B	86501
	C	86502
	B Inv.	86503
	C Inv.	86504
	A	87055
	B	87040
	C	87030
	B Inv.	87140
	C Inv.	87150

* 125° - All models utilizing pipe construction.
** 90° - All models utilizing tubing construction.

- Fig 9-
Transmitter Mounting Positions on Specific SureSite Models



- Fig 10-
Transmitter Installation on SureSite

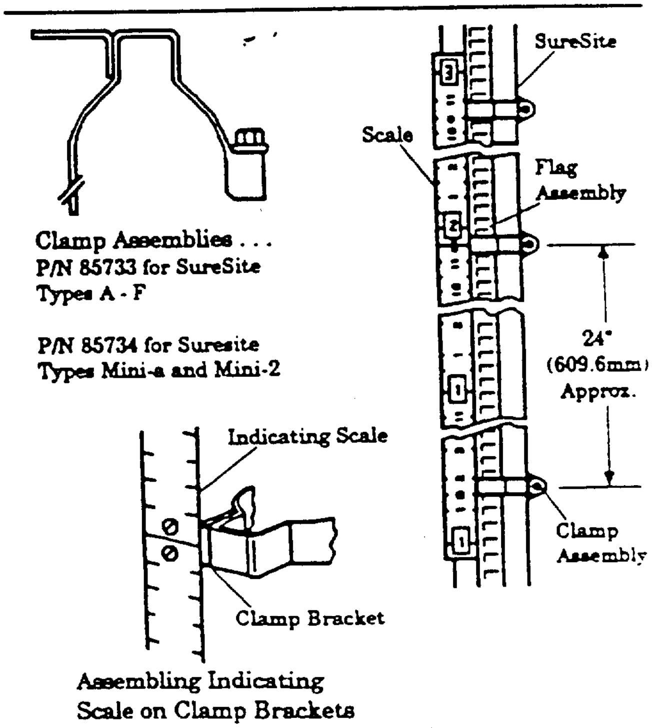
To Install . . .

1. Position transmitter on SureSite, as in Figs. 9 and 10.
2. Loosen upper flag assembly clamp and slide upper transmitter clamp under flag assembly (Fig. 10). Retighten flag assembly clamp. Repeat for lower clamp(s).
3. Tighten all transmitter clamps securely.
4. Connect transmitter cable to receiver. See appropriate GEMS receiver instructions.

Indicating Scale - P/N 85684 . . .

Mounts with bracketed clamps alongside flag assembly on all SureSite models. To install:

1. Assemble bracketed clamps on scale approx. 24" apart (Fig. 11).
2. Mount scale on SureSite with clamps around flag assembly and SureSite. Tighten clamps securely.



- Fig 11-
Installing Indicating Scale on SureSite

SureSite Accessories . . . Installation

Switch Modules . . .

Modules mount opposite flags on the SureSite (Figs. 12 and 13) and are operated by the SureSite float. With lead wires up, switch closes on rising level and remains closed until opened by falling level. With lead wires down, switch opens on rising level and remains open until closed by falling level.

Specifications . . .

Modules P/N 85350, 86435, 87480, 86567 . . .

Housing Material: Polysulfone
Length: 3-1/2" (88.9mm)
Temperature; Max.: +300°F (+149°C)
Switch: SPST, 20 VA, Latching Reed, N.O. or N.C.

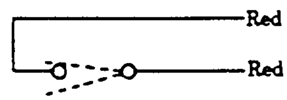
High Temperature Module, P/N 85825 . . . For use with SureSite Types A, B and C, only.

Housing Material: Aluminum
Clamp Assembly: P/N 86440 (18-8SS)
Temperature; Max.: +500°F (+260°C)
Switch: SPST, 20 VA, Latching Reed, N.O. or N.C.

To Install . . .

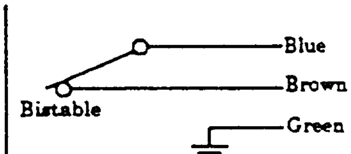
1. Position switch module . . . lead wires up or down . . . at proper actuation level on SureSite (Fig. 12).
2. Slide module clamp under flag assembly and tighten securely.
3. Connect module to load circuit.

Typical Wiring Diagrams . . .



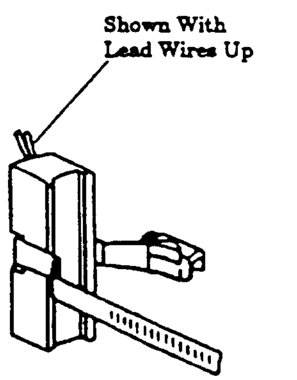
SPST, N.O. or N.C. (Dry)

**Switch Module
P/N 85350 or P/N 87480**



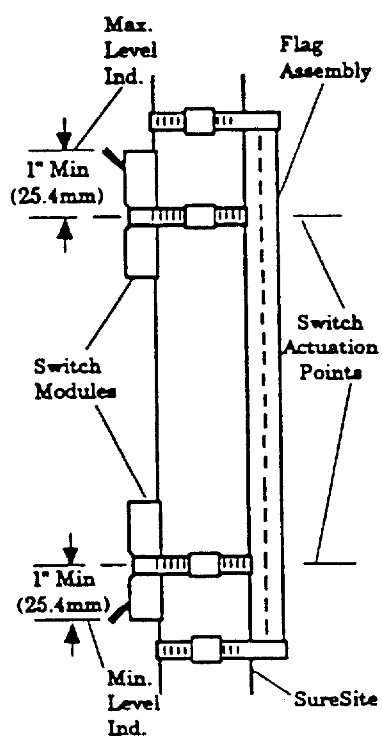
SPST, N.C. or N.O. (Dry)

**High Temperature Switch
Module P/N 85825**

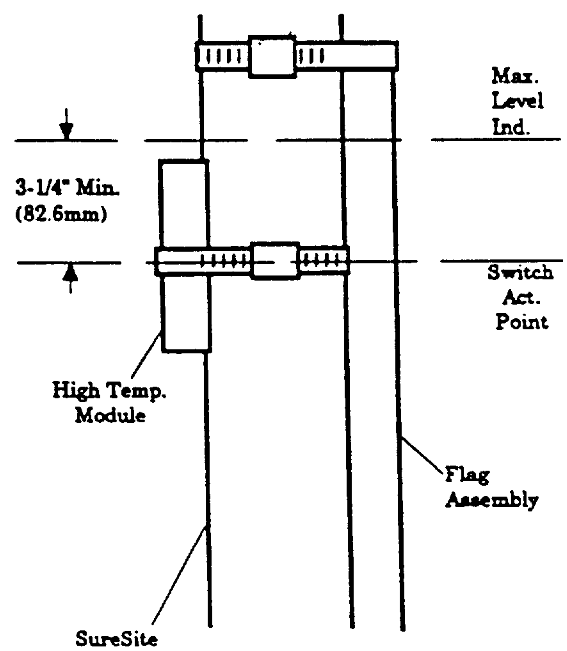


**Standard
Switch Module**

**P/N 85350, W/Out Clamp
P/N 86435, With Clamp
P/N 87480, Mini-Module, W/Out Clamp
P/N 86567, Mini-Module with Mini-clamp**



**- Fig 12 -
Installing Standard Switch
Module on SureSite**

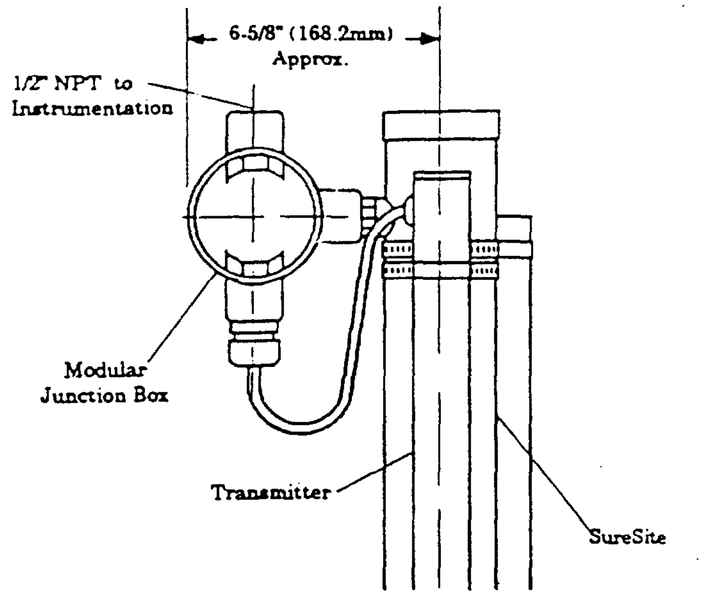


**- Fig 13 -
Installing High temperature
Switch Module on SureSite**

SureSite Accessories . . . Installation . . .

Modular Junction Boxes with Conditioned Outputs . . .

Junction boxes are supplied assembled on the SureSite and connected to transmitter (Fig. 14). See instruction sheet packed in junction box for connection to instrumentation.



- Fig 14 -
Modular Junction Box Assembled on SureSite

Standard Models . . . Specifications.

P/N	Input Voltage	Configuration	Output Signal
86140	———	Terminal Block	———
86156	8-24 VDC	Signal Conditioner	0-5 VDC
85997	14-30 VDC	Signal Conditioner	0-12 VDC
86157	18-30 VDC	Signal Conditioner with Alarms	0-12 VDC
86158	10-40 VDC	Two-Wire Converter	4-20 MA
52560	115 VAC	Power Supply	24 VDC
52570	230 VAC	Power Supply	24 VDC

Troubleshooting . . .

Problem	Possible Cause	Remedy
No Flag Indication with Liquid in Housing	1. Float Sticking 2. Float Upside Down 3. Liquid in Float 4. Ferrous Particles on Float 5. Flag Assembly Upside Down or Incorrectly Mounted	1. Clean Float and Unit 2. Remove and Reinstall Float Correctly 3. Replace Float 4. Clean Housing and Filter Out Particles 5. Invert Flag Assembly or Rotate Around SureSite Until Indication Appears
Switch Module Inoperative	1. Module Wired Incorrectly 2. Module Positioned Incorrectly on SureSite 3. Module Ratings Exceeded	1. Check and Correct Wiring 2. Check Alarm Level and Position Module 180° from Flags 3. Replace Module

Warnings/Cautions . . .

1. Product must be maintained and installed in strict accordance with the GEMS technical brochure and Instruction Bulletin. Failure to observe this warning could result in serious injuries or damages.
2. The pressure and temperature limitations shown on the individual catalog pages and drawings for the specified Liquid Level Indicators must not be exceeded. These pressures and temperatures must take into consideration possible system surge pressures/temperatures and their frequencies.
3. For hazardous area applications involving such things as (but not limited to) ignitable mixtures, combustible dust and flammables, use an appropriate intrinsically safe interface device for any electrical accessories.
4. The liquids used must be compatible with the materials of construction. Specifications of materials will be given upon request.
5. Troubleshooting and maintenance of Liquid Level Indicators should be in strict compliance with procedures set forth in the troubleshooting and maintenance sections of the technical brochure or an Instruction Bulletin.

P/N 128616
(Rev. 8)

IMO

Imo Industries Inc.
Gems Sensors Division
1 Cowles Road
Plainville, CT. 06062-1198 U.S.A.
Tel. 203-677-1311 Fax. 203-747-4244

CALGON
CALGON CARBON CORPORATION

SERVICE BULLETIN

VAPOR PAC

Calgon Carbon's Vapor Pac Service meets industrial needs for cost-effective removal of volatile organic compounds (VOCs) at air emission sources.

The Vapor Pac Service features a small, easily transportable adsorber which contains 1,800 pounds of activated carbon. The adsorber can handle air flows up to 1,000 cfm.

Designed to remove both toxic and non-toxic VOCs, the adsorption system is especially useful for short-term projects and for treatment of low volume flows that contain low to moderate VOC concentrations. Common applications include VOC removal from process vents, soil remediation vents, and air stripper off-gases.

To accommodate a wide variety of process conditions, Vapor Pac adsorbers are available in two basic designs: a polyethylene model that offers excellent corrosion-resistance, and a stainless steel model than can withstand higher temperatures, and slight pressure or vacuum conditions.

Calgon Carbon provides the adsorber, carbon, spent carbon handling and carbon reactivation (after the carbon meets the company's acceptance criteria) as part of the Vapor Pac Service. Ductwork and fans are the only equipment requiring a capital expenditure by the user.

When carbon becomes saturated with VOCs, the system is replaced with another adsorber containing fresh carbon.

By utilizing this unique service, users can generally achieve VOC removal and regulatory compliance objectives, minimize operating costs, and eliminate maintenance costs* (as the equipment is owned and maintained by Calgon Carbon). Furthermore, because organic compounds are safely destroyed through the carbon reactivation process, costs and regulations typically associated with waste disposal can be eliminated.

Please contact a Calgon Carbon Technical Sales Representative to learn more about the advantages of the Vapor Pac Service for your specific VOC control needs.

*Damage to Vapor Pac Unit caused by negligence or misapplication is the responsibility of the user.

FEATURES AND BENEFITS OF VAPOR PAC SERVICE

- Adsorbers are specifically designed for ease of installation and operation.
- Adsorbers are available in plastic (polyethylene) and metal (stainless steel) construction to accommodate a wide variety of applications.
- System can be operated in series or parallel mode or a combination of both modes to handle a variety of flowsand concentrations.
- System exchange eliminates on-site carbon handling.
- Recycling of spent carbon eliminates disposal problems.
- Capital expenditure is eliminated since Calgon Carbon Corporation owns and maintains equipment.

VAPOR PAC (PLASTIC) SPECIFICATIONS

Vessel dimensions: .... 44¼" x 44¼" x 89⅜"
Inlet & discharge connections: .... 6" PS 15-69 duct flanges
Carbon volume: .... 60 cu. ft. (1800 lbs)
System shipping weight: .... New - 2200 lbs
Spent - 4000 lbs
Temperature rating: .... 150°F max
Static pressure rating above carbon level: .... 20" W.C. max
Vacuum pressure rating above carbon level: .... 2" W.C. max

All units shipped F.O.B., Pittsburgh, Pennsylvania

MATERIALS OF CONSTRUCTION

Vessel: .... Polyethylene
Frame: .... Carbon steel coated with Sherwin Williams Tile Clad II
Inlet flanges, elbow, septum: .... PVC
Discharge flange: .... Polyethylene
Fasteners & bottom valve support plate: .... Steel, plated
Sample fittings & sample canister: .... PVC

VAPOR PAC (STAINLESS STEEL) SPECIFICATIONS

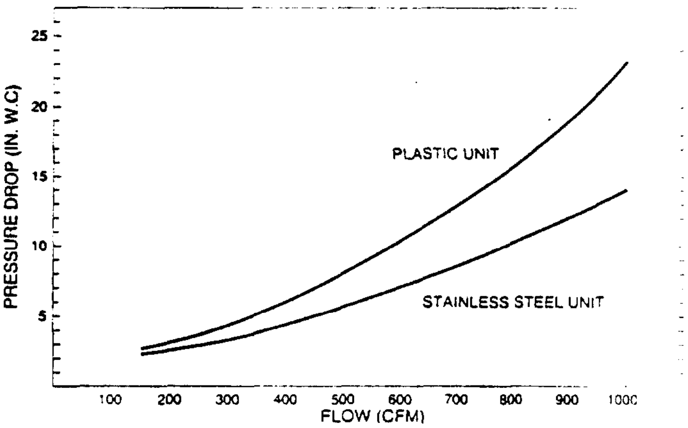
Vessel dimensions, diameter: .... 5'
height: .... 7'3"
Inlet & discharge connections: .... 8" PS 15-69 duct flanges
Carbon volume: .... 60 cu. ft. approx. (1800 lbs)
System shipping weight: .... New - 2840 lbs
Spent - 4640 lbs
Static pressure rating above carbon level: .... 15 psig
Vacuum pressure rating above carbon level: .... Full

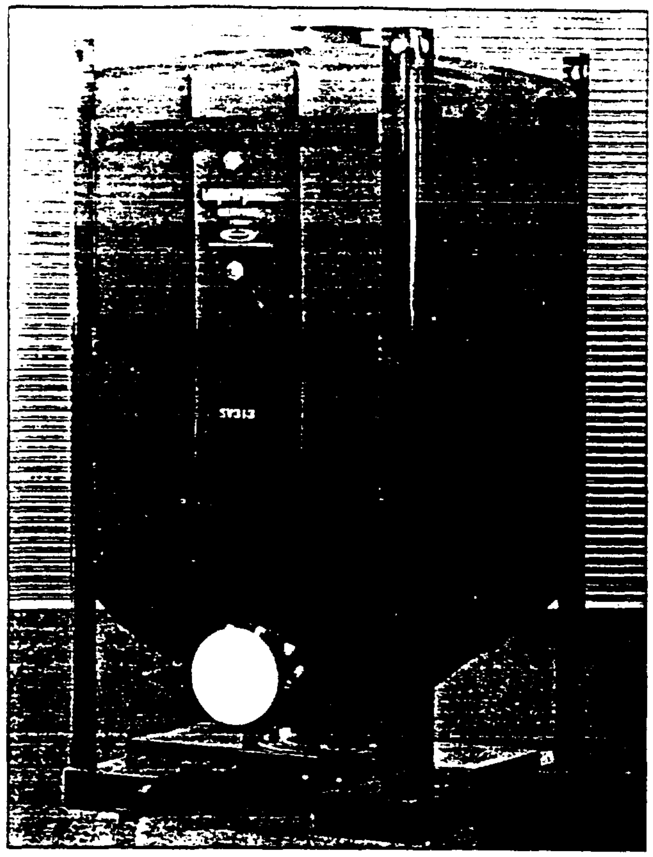
All units shipped F.O.B., Pittsburgh, Pennsylvania

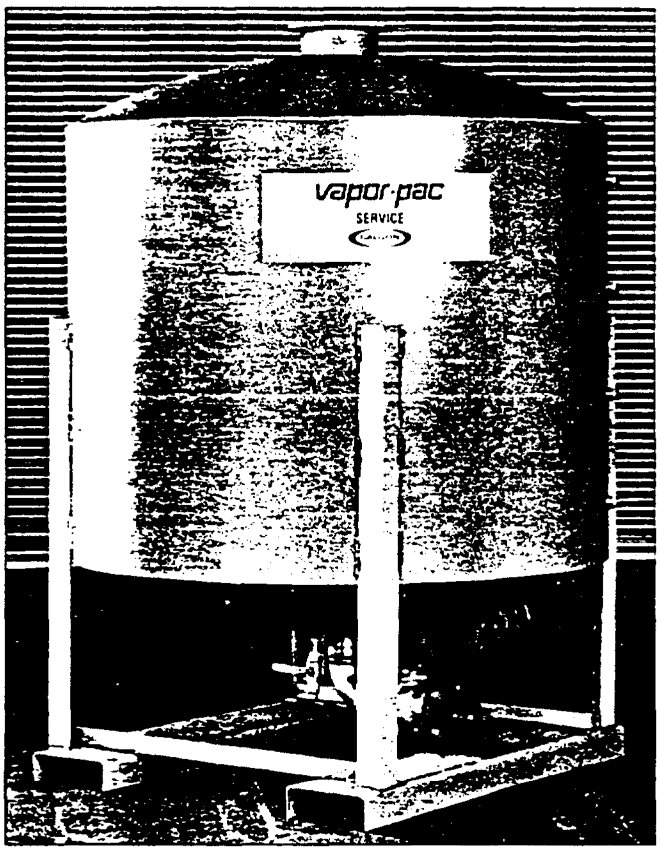
MATERIALS OF CONSTRUCTION

Vessel .... 316L stainless steel
Skid and support frame: .... 304 stainless steel
Inlet flanges, elbow, septum: .... 316L stainless steel
Discharge flange: .... 316L stainless steel
Fasteners & bottom valve
support plate: .... Steel, plated
Sample fittings &
sample canister: .... 316L stainless steel

VAPOR-PAC UNIT PRESSURE DROP
UPFLOW WITH 180OLBS . 4x10 MESH CARBON DENSE PACKED







CAUTION

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing activated carbon, appropriate sampling and work procedures should be followed, including all applicable federal and state requirements.

For information regarding human and environmental exposure, call Calgon Carbon's Regulatory and Trade Affairs personnel at (412) 787-6700.

INSTALLATION INSTRUCTIONS

See Bulletin #27-199 for details on how to install a Vapor-Pac.

SAFETY CONSIDERATIONS

See Safety Bulletin #27-198 for important safety considerations.

OPTIONAL EQUIPMENT

Inlet and outlet flange connectors for ANSI hose connections.

For additional information, contact
Calgon Carbon Corporation,
Box 717, Pittsburgh, PA 15230-0717,
Phone (412) 787-6700

CALGON

APPENDIX G

AIR DISPERSION MODELING RESULTS

AIR DISPERSION SUMMARY REPORT
FOR OPERABLE UNIT 2
AT MARINE CORPS AIR STATION
CHERRY POINT, NORTH CAROLINA

ESTIMATED MAXIMUM CONCENTRATION AT RECEPTOR HEIGHT 1.6 METERS

Stack Diameter (inch) 8 **Stack Flow (acfm)** 950 **Stack Height (feet)** 20

CHEMICAL	Vinyl Chloride	Chloroethane	Methylene Chloride	1,1 Dichlorethane	1,2 cis Dichloroethene	Benzene	Trichloroethene
Molecular Weight	62.5	64.52	50.49	98.97	98.97	78.11	131.4
Max Conc (ppbv) pilot study	40000	1400	4900	1500	24000	2300	2000
Max Conc (ug/m3)	103950	3756	10287	6173	98764	7470	10927
Emission Rate (g/sec)	0.04661	0.00168	0.00461	0.00277	0.04428	0.00335	0.00490
Distance (meters) from Stack					Estimated Concentration in (ug/m3)		
20	30.8	1.1	3.1	1.8	29.3	2.2	3.2
30	44.4	1.6	4.4	2.6	42.2	3.2	4.7
40	49.0	1.8	4.9	2.9	46.6	3.5	5.2
50	49.2	1.8	4.9	2.9	46.7	3.5	5.2
60	46.8	1.7	4.6	2.8	44.5	3.4	4.9
70	47.2	1.7	4.7	2.8	44.8	3.4	5.0
80	45.9	1.7	4.5	2.7	43.6	3.3	4.8
90	43.0	1.6	4.3	2.6	40.8	3.1	4.5
100	39.5	1.4	3.9	2.3	37.5	2.8	4.1
110	35.9	1.3	3.5	2.1	34.1	2.6	3.8
120	32.4	1.2	3.2	1.9	30.8	2.3	3.4
130	29.3	1.1	2.9	1.7	27.9	2.1	3.1
140	26.5	1.0	2.6	1.6	25.2	1.9	2.8
150	24.0	0.9	2.4	1.4	22.8	1.7	2.5
160	21.8	0.8	2.2	1.3	20.7	1.6	2.3
170	19.9	0.7	2.0	1.2	18.9	1.4	2.1
180	18.2	0.7	1.8	1.1	17.3	1.3	1.9
190	17.1	0.6	1.7	1.0	16.3	1.2	1.8
200	17.1	0.6	1.7	1.0	16.2	1.2	1.8
Max. Dispersion Conc.	49.2	1.8	4.9	2.9	46.7	3.5	5.2
Stack Dispersion Factor	2114	2114	2114	2114	2114	2114	2114
Min [TLV,PEL,REL] (ug/m3)	2.6E+03	2.6E+05	1.7E+05	4.1E+05	7.9E+05	1.6E+03	2.7E+05
TLV/100 (ug/m3)	26	2640	1740	4050	7930	16	2690
Maximum Stack Concentration to Achieve [TLV/100*Stack Dispersion Factor] at a Receptor Height of 1.6 Meters:							
Max at Stack (ug/m3)	5.5E+04	5.6E+06	3.7E+06	8.6E+06	1.7E+07	3.4E+04	5.7E+06
Max at Stack (ppbv)	2.1E+04	2.1E+06	1.8E+06	2.1E+06	4.1E+06	1.0E+04	1.0E+06
Max at Stack (ppmv)	21.2	2080.4	1752.2	2080.6	4073.9	10.4	1040.9

CHEMICAL	Chlorobenzene	Ethylbenzene	Xylene(o&p)	Xylene(m)	MIBK	Toluene
Molecular Weight	112.56	106.16	106.16	106.16	100.16	92.13
Max Conc (ppbv) pilot study	1200	8000	17000	2800	3300	45000
Max Conc (ug/m3)	5616	35313	75040	12360	13743	172385
Emission Rate (g/sec)	0.00252	0.01583	0.03364	0.00554	0.00616	0.07729
Distance (meters) from Stack						
20	1.7	10.5	22.3	3.7	4.1	51.1
30	2.4	15.1	32.1	5.3	5.9	73.6
40	2.6	16.7	35.4	5.8	6.5	81.3
50	2.7	16.7	35.5	5.8	6.5	81.5
60	2.5	15.9	33.8	5.6	6.2	77.7
70	2.5	16.0	34.0	5.6	6.2	78.2
80	2.5	15.6	33.1	5.5	6.1	76.1
90	2.3	14.6	31.0	5.1	5.7	71.3
100	2.1	13.4	28.5	4.7	5.2	65.4
110	1.9	12.2	25.9	4.3	4.7	59.5
120	1.8	11.0	23.4	3.9	4.3	53.8
130	1.6	10.0	21.2	3.5	3.9	48.6
140	1.4	9.0	19.1	3.2	3.5	44.0
150	1.3	8.2	17.3	2.9	3.2	39.8
160	1.2	7.4	15.8	2.6	2.9	36.2
170	1.1	6.8	14.4	2.4	2.6	33.0
180	1.0	6.2	13.1	2.2	2.4	30.1
190	0.9	5.8	12.4	2.0	2.3	28.4
200	0.9	5.8	12.3	2.0	2.3	28.4
Max. Dispersion Conc.	2.7	16.7	35.5	5.8	6.5	81.5
Stack Dispersion Factor	2114	2114	2114	2114	2114	2114
Min [TLV,PEL,REL] (ug/m3)	4.6E+04	4.4E+05	4.3E+05	4.3E+05	2.1E+05	1.9E+05
TLV/100 (ug/m3)	460	4350	4340	4340	2050	1880
Maximum Stack Concentration to Achieve [TLV/100*Stack Dispersion Factor] at a Receptor Height of 1.6 Meters:						
Max at Stack (ug/m3)	9.7E+05	9.2E+06	9.2E+06	9.2E+06	4.3E+06	4.0E+06
Max at Stack (ppbv)	2.1E+05	2.1E+06	2.1E+06	2.1E+06	1.0E+06	1.0E+06
Max at Stack (ppmv)	207.8	2083.4	2078.6	2078.6	1040.6	1037.5

07/29/97
14:25:36

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Cherry Point OU2 with 6.6 meter stack

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	6.6000
STK INSIDE DIAM (M)	=	.2200
STK EXIT VELOCITY (M/S)	=	11.7946
STK GAS EXIT TEMP (K)	=	340.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	1.6000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	.0000
MIN HORIZ BLDG DIM (M)	=	.0000
MAX HORIZ BLDG DIM (M)	=	.0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 950.00000 (ACFM)

BUOY. FLUX = .193 M**4/S**3; MOM. FLUX = 1.451 M**4/S**2.

* FULL METEOROLOGY ***

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

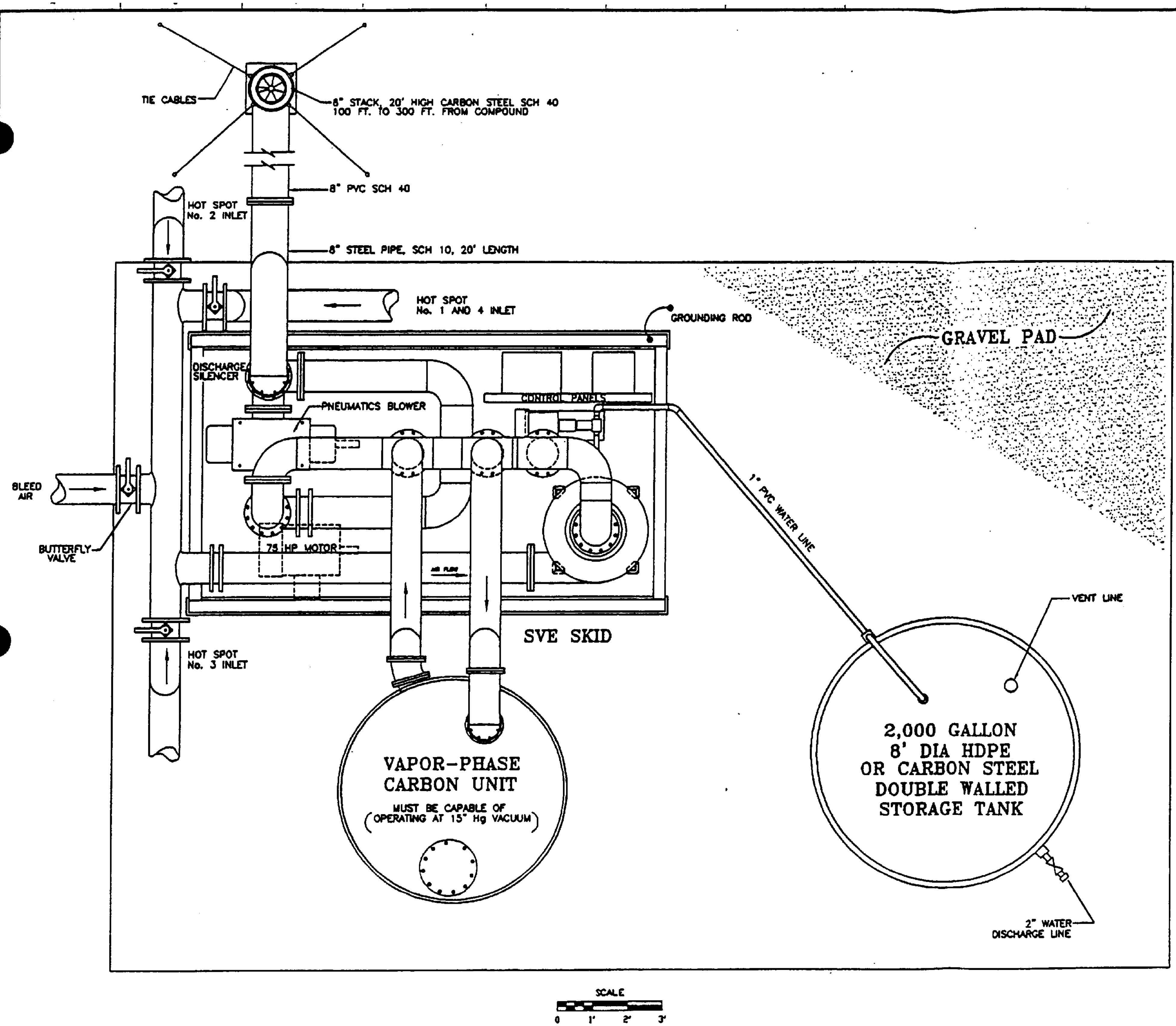
DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
20.	661.6	1	2.5	2.5	800.0	9.71	6.44	4.93	NO
30.	952.9	3	2.0	2.0	640.0	10.49	6.65	6.10	NO
40.	1052.	3	1.5	1.5	480.0	11.79	8.86	8.14	NO
50.	1055.	3	1.0	1.0	320.0	14.38	11.12	10.24	NO
60.	1005.	4	1.5	1.5	480.0	11.79	9.60	8.46	NO
70.	1012.	4	1.0	1.0	320.0	14.38	11.27	9.95	NO
80.	984.7	4	1.0	1.0	320.0	14.38	12.79	11.29	NO
90.	922.2	4	1.0	1.0	320.0	14.38	14.32	12.63	NO
100.	846.6	4	1.0	1.0	320.0	14.38	15.85	13.97	NO
110.	769.4	4	1.0	1.0	320.0	14.38	17.37	15.31	NO
120.	696.1	4	1.0	1.0	320.0	14.38	18.89	16.65	NO
130.	629.1	4	1.0	1.0	320.0	14.38	20.40	17.99	NO
140.	568.9	4	1.0	1.0	320.0	14.38	21.91	19.33	NO
150.	515.5	4	1.0	1.0	320.0	14.38	23.42	20.66	NO
160.	468.3	4	1.0	1.0	320.0	14.38	24.92	21.99	NO
170.	426.6	4	1.0	1.0	320.0	14.38	26.41	23.32	NO
180.	389.8	4	1.0	1.0	320.0	14.38	27.90	24.65	NO
190.	367.6	6	1.0	1.0	10000.0	20.86	20.56	14.01	NO
200.	366.8	6	1.0	1.0	10000.0	20.86	21.56	14.61	NO

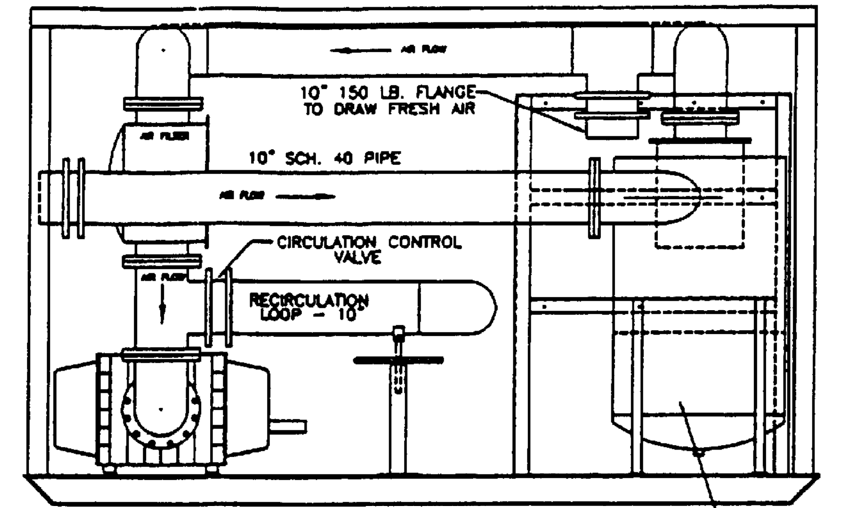
```
DWASH=   MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
  ASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB
```

```
***************************************
*** SUMMARY OF SCREEN MODEL RESULTS ***
***************************************
```

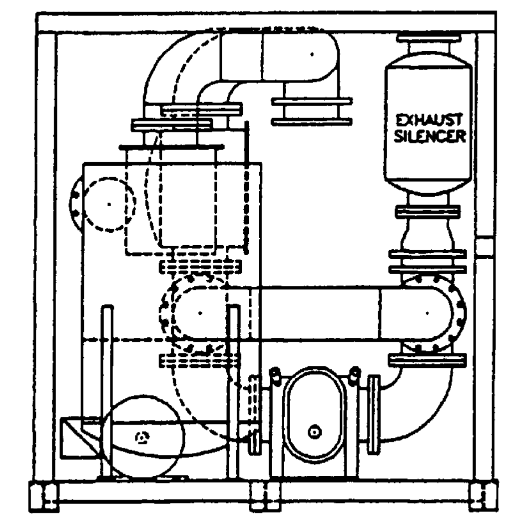
CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1055.	50.	0.

```
***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```





PLAN VIEW
N.T.S.



SIDE VIEW
N.T.S.

1000 CFM SVE UNIT
OHM UNIT #: 7541 & 7542
Approx. Weight: 14,000 Lbs.

BLOWER/MOTOR DRIVE PARTS:	PART NO.:	
		29 LB.
DRIVE SHEAVE (MOTOR)	T.B.WOODS: 5V 10.9 X 4-E	18 LB
DRIVE SHEAVE (BLOWER)	T.B.WOODS: 5V 6.3 X 4-SK	3 LB.
BLOWER TAPER BUSHING	T.B.WOODS: SK X 2.375	3 LB.
MOTOR TAPER BUSHING	T.B.WOODS: E X 2.375	8 LB.
DRIVE BELT	T.B WOODS: 5VX1000	48 LB.
MOTOR SLIDE BASE	BROWNING: MB 365 T	

EQUIPMENT:		
		1275 LB.
		1020 LB.
BLOWER	MD PNEUMATICS: 7017-57B2 (10")	155 LB.
MOTOR (1760 RPM)	BALDOR: M-7068-T 75 HP (E/P)	120 LB.
AIR FILTER	STODDARD: F65-8 F8-139	100 LB.
SILENCER	UNIVERSAL: SU 8 ANNULAR FLOW	750 LB.
TRANSFER PUMP	JABSCO: 30530 W/2 HP EXP MOTOR	160 LB.
ELECTRICAL ENCLOSURE (E/P)	KILLARK: XJB-204010	
ELECTRICAL ENCLOSURE (E/P)	KILLARK: EXB-12248	720 LB.
LIQUID LEVEL SWITCHES	WARWICK: 3218 E3A 3W2 321A	
36" DROP OUT TANK	FMT MFG. DWG. NO.: 93-100-1T	
SITE TUBE	SHURE SITE: 80861-VL1-8620-2-036-0-8-SS-SP	

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED:	PROJECT MANAGER	DATE:
APPROVED:	SR. PROJECT ENGINEER	DATE:
APPROVED:	DEPT. MANAGER	DATE:

AT FULL SCALE
(IF NOT 3"-SCALE ACCORDINGLY)
CADD FILE:
DRAWN: J. COLLINS
DESIGNED: F. HAAS
CHECKED: G. GILLES
CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

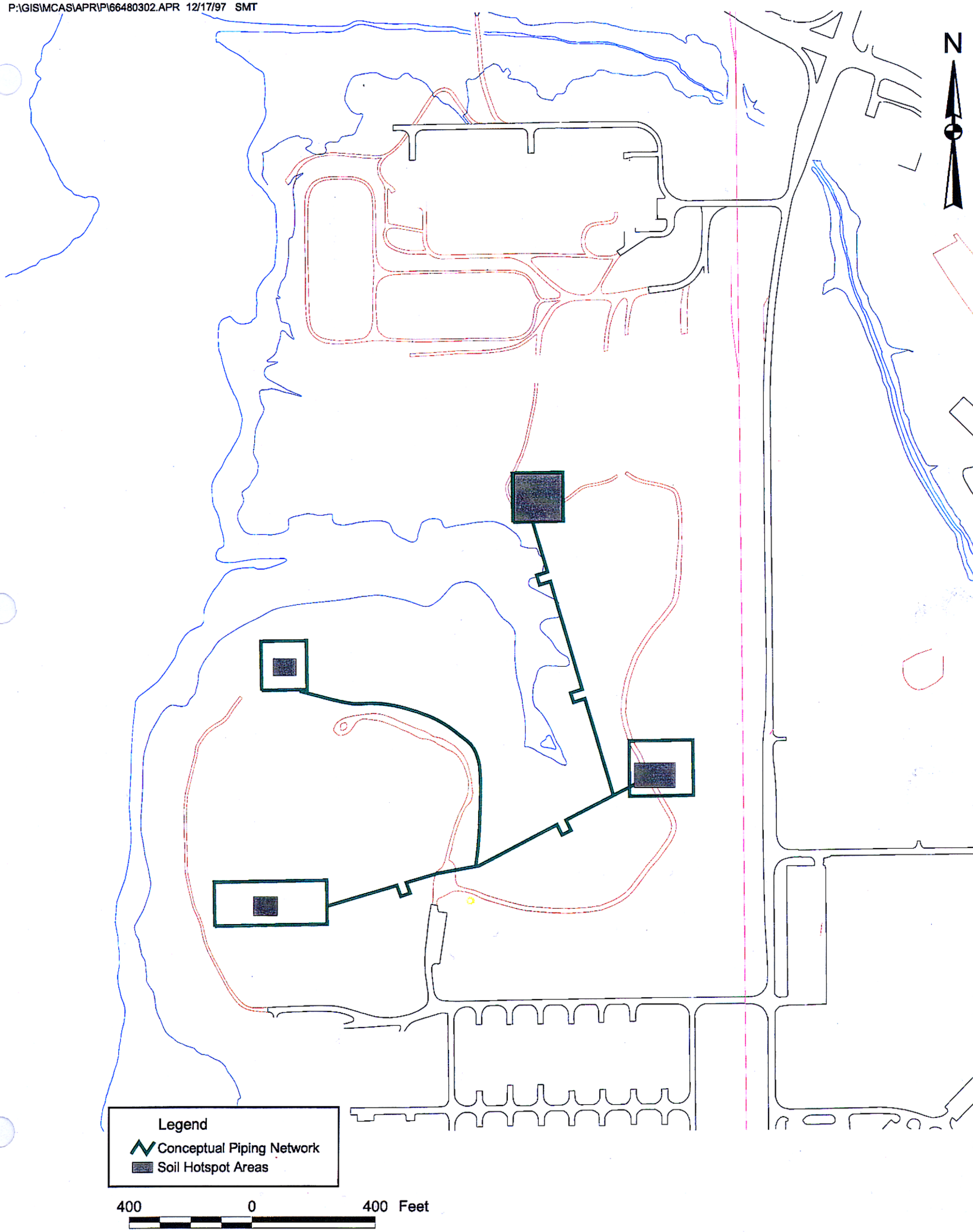
FIGURE 7

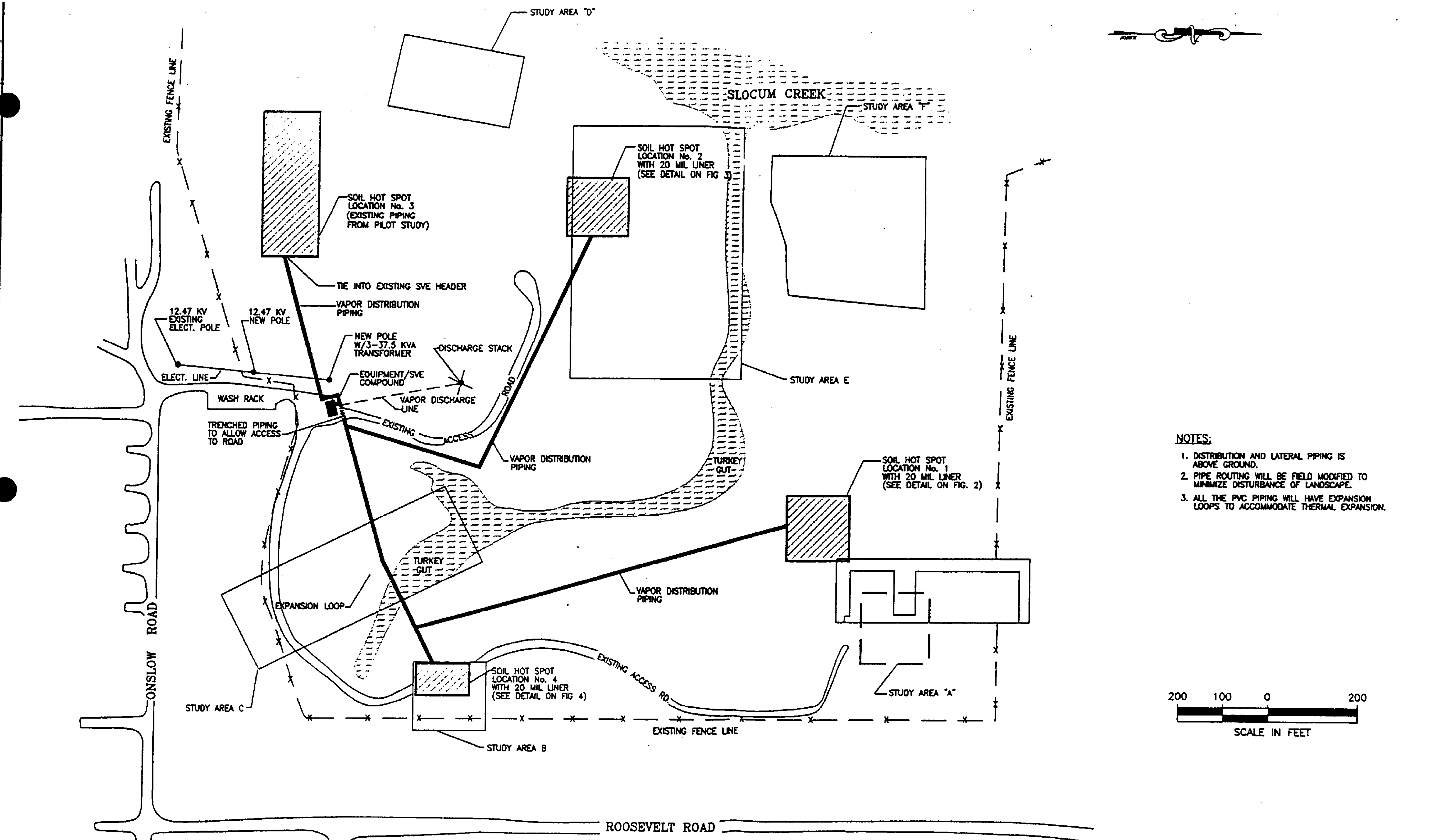
EQUIPMENT COMPOUND
AND DETAILS
OU2-SITE 10

CHERRY POINT, NORTH CAROLINA

G:\OHM2\CHERRYPT\17488\1000.DWG

P:\GIS\MCAS\APR\P\66480302.APR 12/17/97 SMT





C:\OHM3\CHERRYPT\17488\BASE.DWG

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APPROVED: SR. PROJECT ENGINEER DATE:
APPROVED: DEPT. MANAGER DATE:

AT FULL SCALE (IF NOT 3"-SCALE ACCORDINGLY)
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CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION — NORFOLK, VIRGINIA
CONTRACT N62470-93-D-3032 — DELIVERY ORDER NO. 0080
OHM PROJECT No. 17488 — MARINE CORPS AIR STATION, CHERRY POINT, N.C.

FIGURE 5
SITE PLAN
AND
VE DISTRIBUTION PIPING
OU2-SITE 10
CHERRY POINT
NORTH CAROLINA

DRAWING NUMBER: —
SHEET NUMBER: of
DATE:

UTILITY CONNECTION

PROCESS INLET	10" 150# SCH 40 FLANGE
PROCESS OUTLET	10" 150# SCH 40 FLANGE
CARBON CELL INLET/OUTLET	10" 150# SCH 40 FLANGE
KNOCKOUT TANK DRAIN OUTLET	1" SCH 40 CS
ELECTRICAL SERVICE ENTRANCE	200 AMPS, 480/277V, 3Ø, 60Hz

P-107
LIQUID TRANSFER PUMP
15.2 GPM
50 PSIG
2 HP

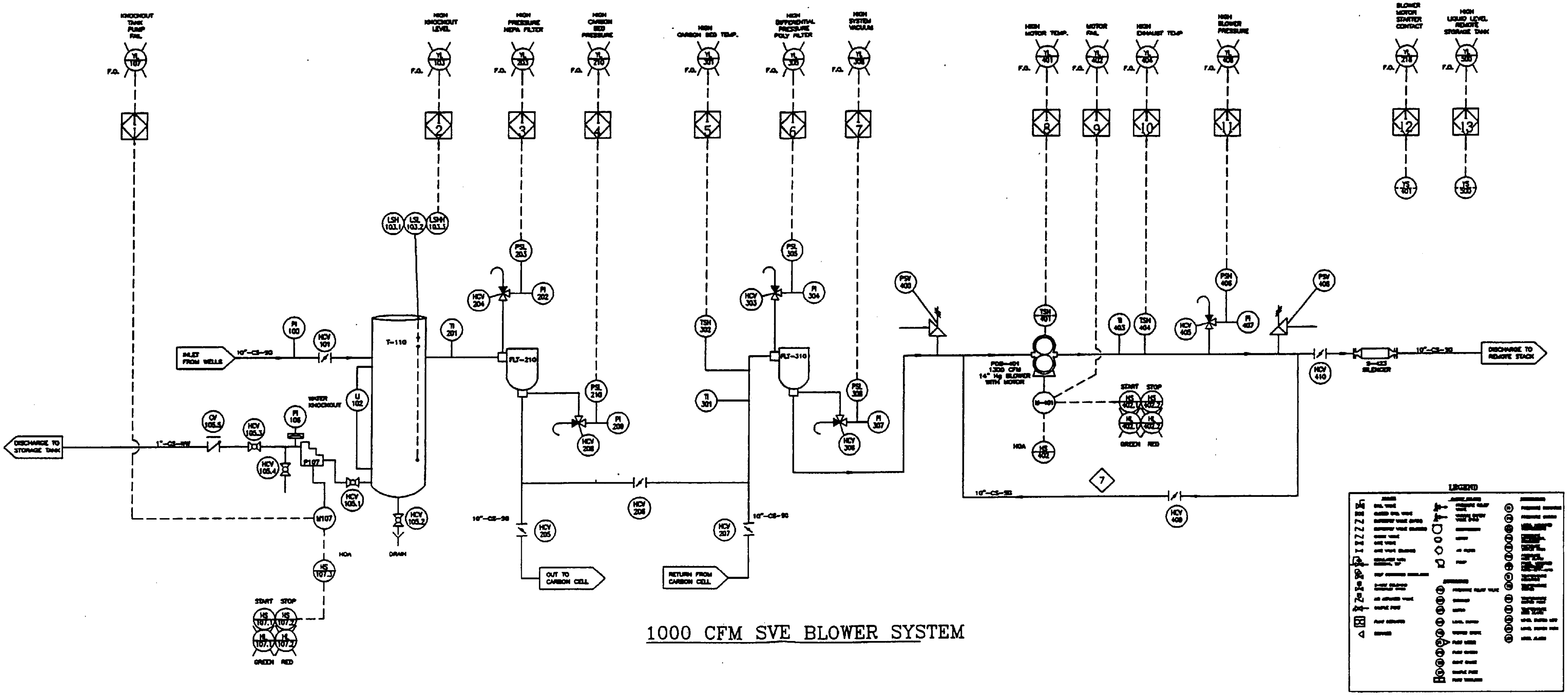
T-110
DEMISTER/
KNOCKOUT TANK
36" O.D. x 59"
50 GAL. CAP.

FLT-210
HEPA FILTER

FLT-310
POLY FILTER

PDB-401
PNEUMATIC BLOWER
1300 CFM
-14" Hg
2200 RPM
● 190°F TEMP. RISE

S-423
UNIVERSAL URD-8
32 dBa REDUCTION



1000 CFM SVE BLOWER SYSTEM

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: PROJECT MANAGER DATE:
APPROVED: SR. PROJECT ENGINEER DATE:
APPROVED: DEPT. MANAGER DATE:

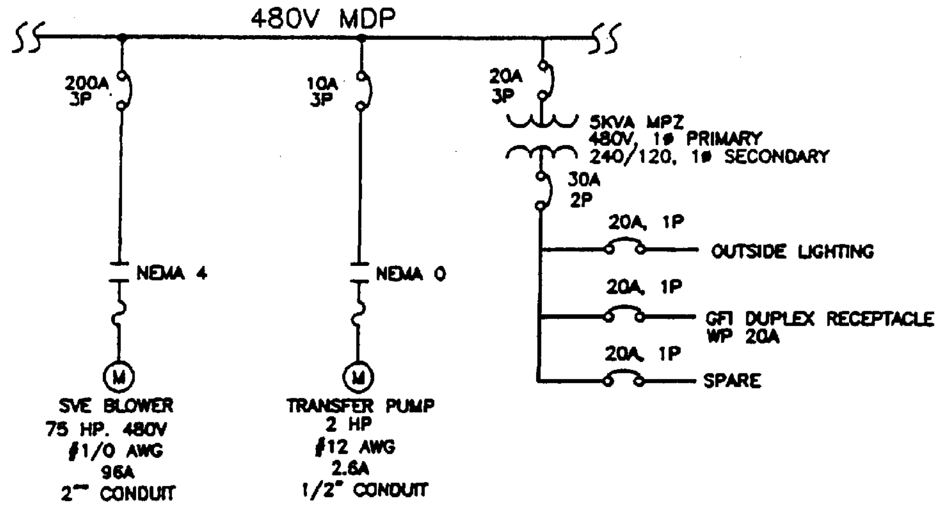
AT FULL SCALE
CADD FILE:
DRAWN: J. COLLINS
DESIGNED: F. HAAS
CHECKED: G. GILLES
CHECKED:

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

FIGURE 6
SVE SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM OU2-SITE 10

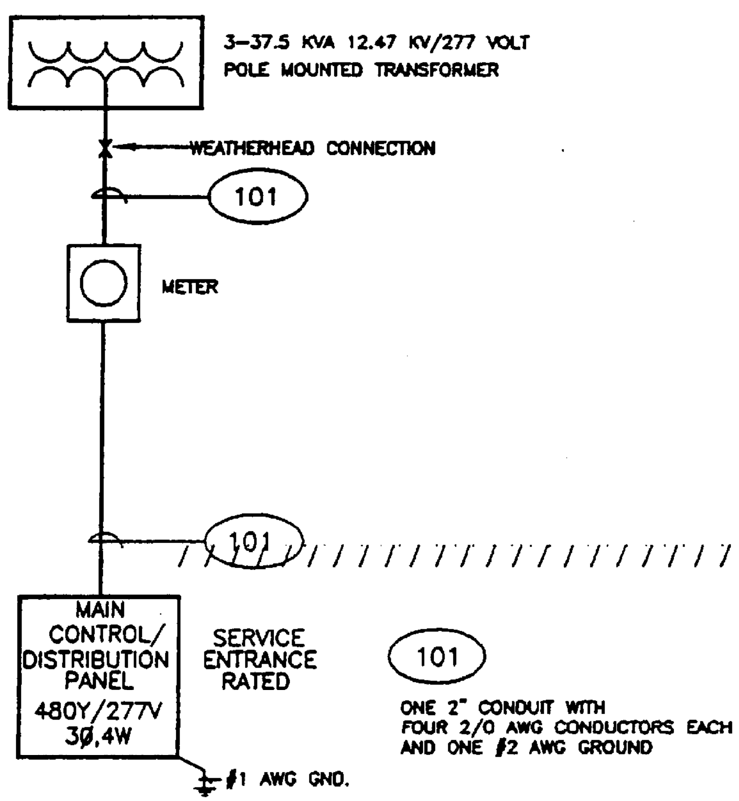
PREPARED FOR
CHERRY POINT
NORTH CAROLINA

G:\OHM2\CHERRYPT\17488\647-100.DWG



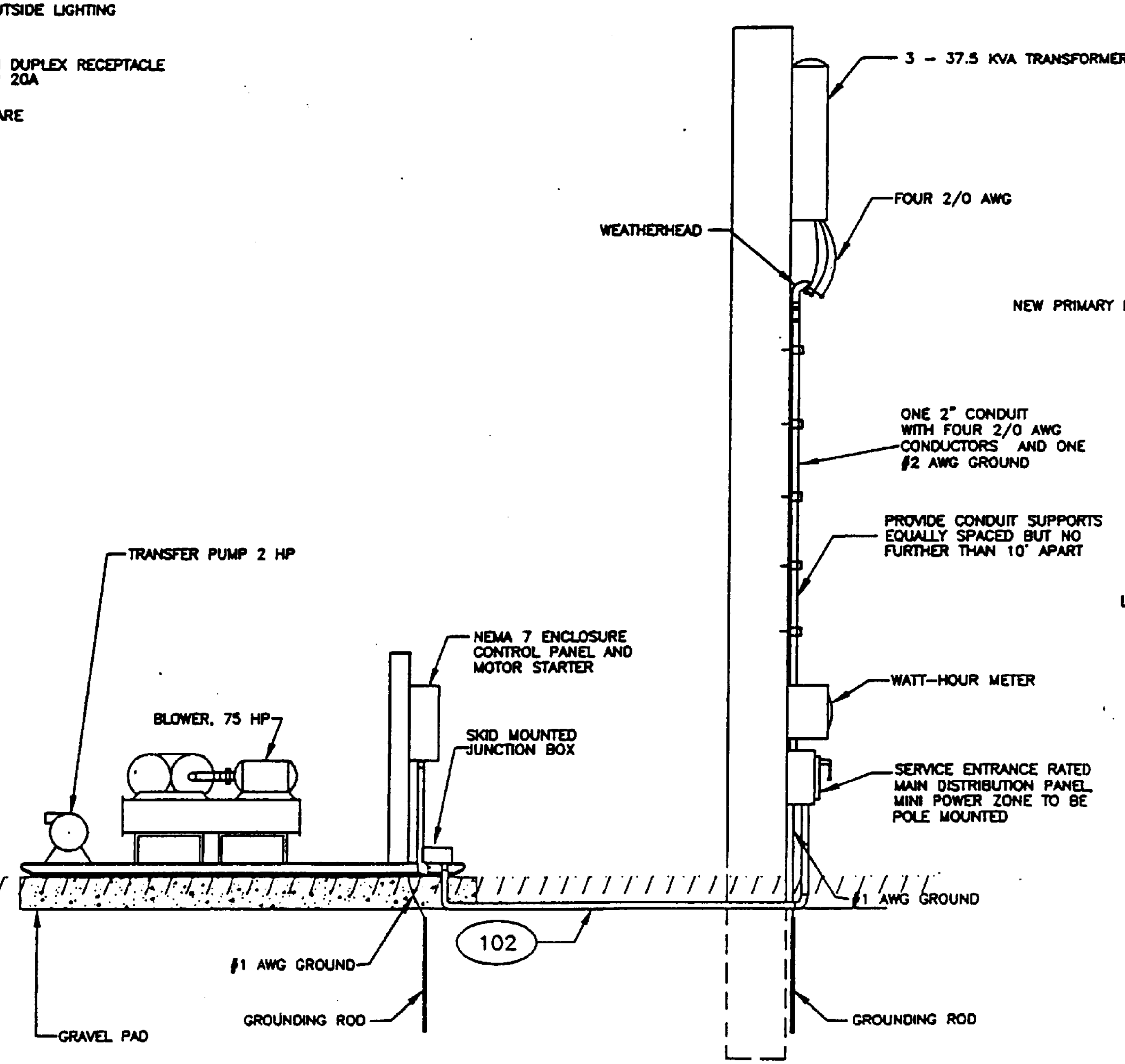
ONE LINE DIAGRAM

N.T.S.



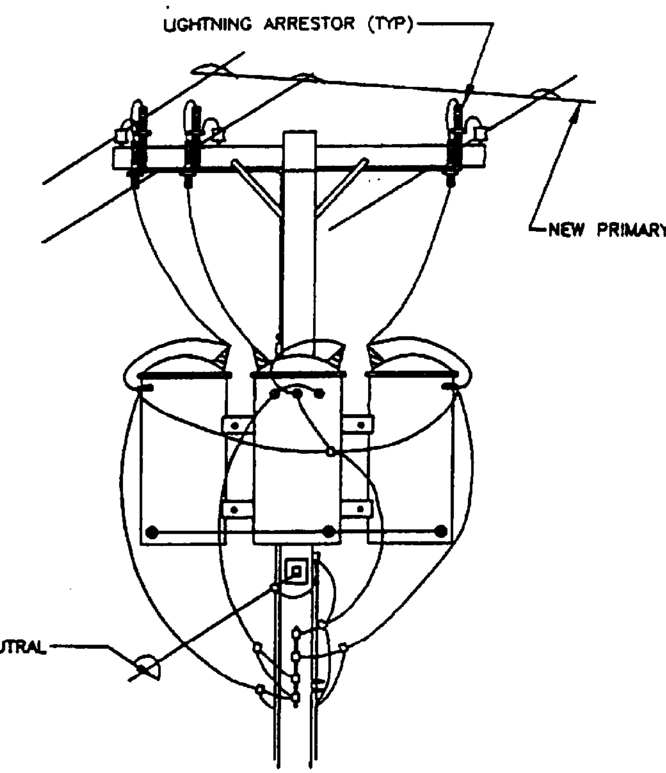
POWER DISTRIBUTION BLOCK DIAGRAM

N.T.S.



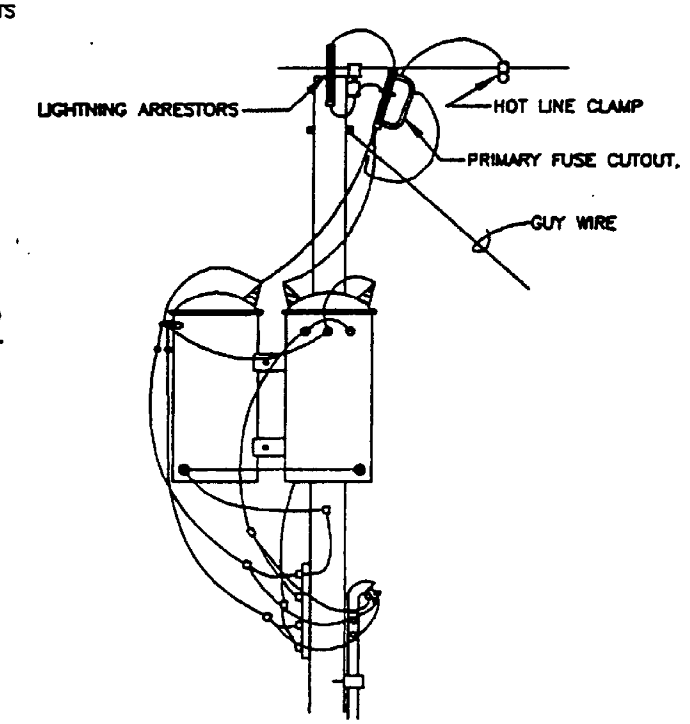
MAIN DISTRIBUTION PLAN

N.T.S.



ELEVATION

N.T.S.



SIDE ELEVATION

N.T.S.

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED:	PROJECT MANAGER	DATE:	
APPROVED:	SR. PROJECT ENGINEER	DATE:	
APPROVED:	DEPT. MANAGER	DATE:	

NOT TO SCALE
CADD FILE:
DRAWN: J. COLLINS
DESIGNED: F. HAAS
CHECKED:
CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	1	-	JC	8/22/97	

FIGURE 9

MAIN ELECTRICAL DISTRIBUTION DETAILS